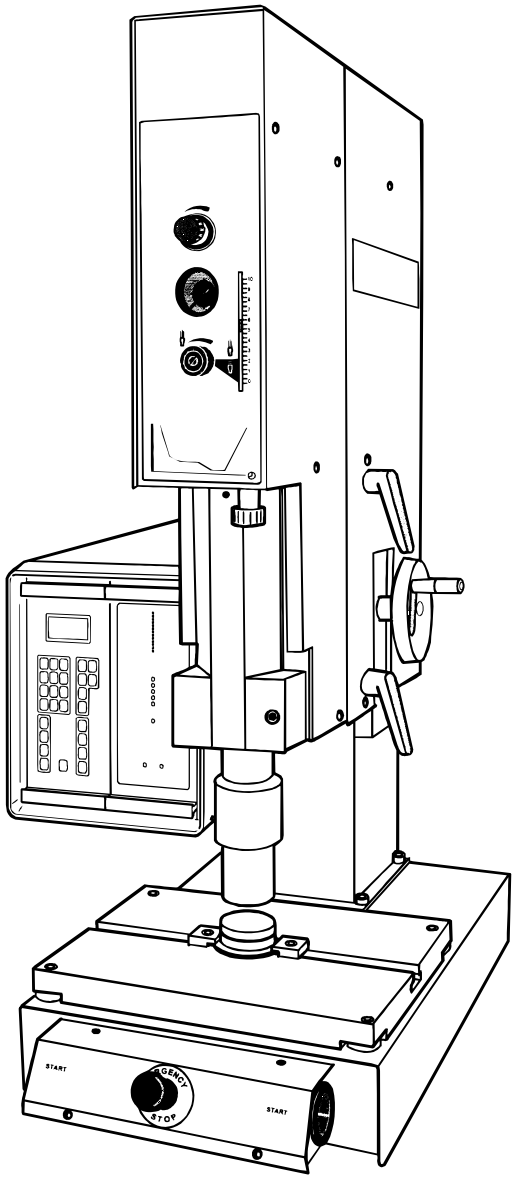
Ultrasonic Welder for Plastics

Multipress MP202

with

Generator PCS



CE

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Note

Read this operating manual and study it carefully before unpacking and putting the machine into operation.

The machine may only be used, maintained and repaired by persons who are familiar with the operating manual and the applicable regulations concerning working safety and accident prevention.

Machine specification

Sticker

Multipress

Sticker

Generator

Representative

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Preface

Congratulations on having purchased the Multipress.

This manual is designed to provide buyers and users with all the information they will need to handle, install, operate and maintain the Multipress.

To ensure that the system is always ready for operation, it is necessary to follow the notes and instructions in this manual.

The manual is broken down into the following chapters:

Chapter **Safety information**
Contains notes and warnings concerning the operation of the welding system.

Chapter **Product information**
Contains all the general information concerning:
- function, design and mode of operation
- technical data
- warranty

Chapter **Transportation**
Contains necessary information on the transportation and receipt of the press.

Chapter **Operating and display elements**
Describes the operating elements.

Chapter **Initial start-up**
Provides important notes and instructions concerning the installation, connection and start-up of the device.

Includes all the information and procedures necessary for the safe and efficient handling of the Multipress.

Chapter **Operation**
Explains the sequence and operation of a welding cycle.

Chapter **Elements**
Describes the various exchangeable elements.

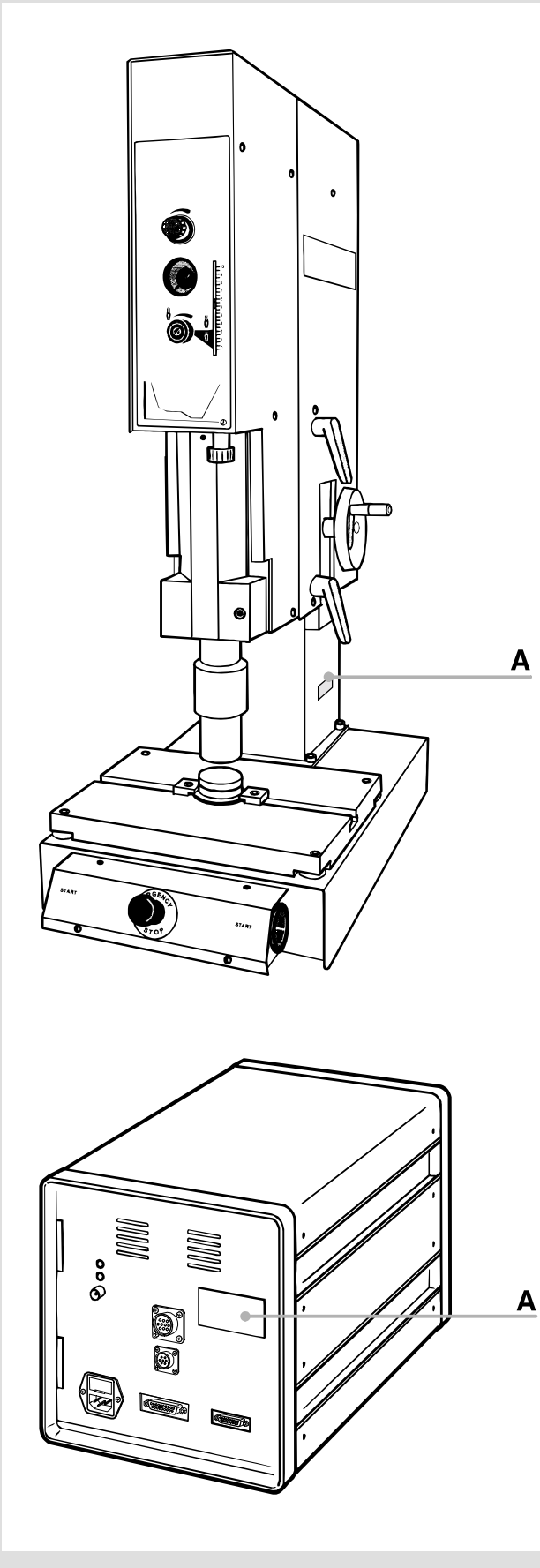
Chapter **Application examples**
Describes the different possibilities of welding applications.

Chapter **Retooling**
Describes how to change a horn or booster.

Chapter **Cleaning and maintenance**
Contains instructions and notes concerning the care and upkeep of the press.

Chapter **Error messages and corrective action**
Describes possible errors, their likely sources and suggestions for corrective action.

Other chapters **Diagrams and drawings**



Important

Please quote the exact type designation and the unit serial numbers in all enquiries concering your Multipress and your Generator.

You will find this data on the rating plate (A) at the back of each unit, as well as on the inside cover flap of this operating manual.

The design and circuitry of these units are subject to continuous further development and improvement, and represent the latest state of the art.

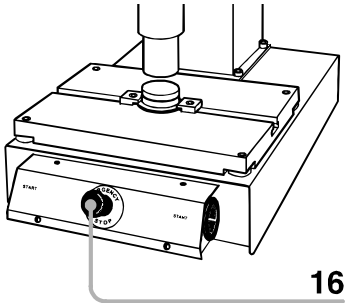
RINCO ULTRASONICS AG
Romanshorn, Switzerland

1 Explanation of symbols and signs

Special attention should be paid to passages with the following symbols:

Special information or operating instructions.

Warnings regarding risk of personal injury or damage to parts of the equipment.



The item numbers used in the illustrations and descriptions, e.g.:

EMERGENCY STOP button (16)

correspond to the item numbering adopted in the product overview included in the chapter "Product information", or to adjacent drawings, generally on the same page.

2 Safety information

2.1 General

The design of the Multipress and generator conforms to the current state of engineering and is safe to operate.

The individual modules and the complete unit are subject to continual inspection by our quality assurance department.

2.2 Intended purpose

The Multipress is intended exclusively for the ultrasonic welding of suitable plastics. Any other use is regarded as inconsistent with the intended purpose, and is undertaken at the user's own risk. The manufacturer is not liable for any resultant damage.

Intended for industrial use.

2.3 Special points to note

Before you start up the machine for the first time, read this operation manual carefully.

Being badly informed about how to operate and look after the press and generator can result in damage.

Always keep the operating manual handy at the site of the Multipress.

Do not perform any modifications, extensions or conversions on the Multipress which might endanger safety without the supplier's consent.

Do not alter the programming (software) of programmable control systems.

2.4 Choosing staff

Work on the Multipress may only be performed by reliable staff. Only use trained or instructed staff, and make sure that staff responsibilities for operation, set-up, maintenance and repairs are clearly defined.

Make sure that the Multipress is only used by authorized staff.

Work on the electrical installations of the Multipress may only be performed by an electrical specialist or instructed staff under the management and supervision of an electrical specialist, according to electrical engineering standards.

Only trained staff with knowledge and experience of pneumatic systems may work on the pneumatic equipment.

2.5 Installing the units

Always unplug the power cable before making any connections to peripheral units.

Be sure to fit the power supply with a grounding connector!

Observe any statutory safety regulations in force in your country!

Failure to observe these regulations will exempt the manufacturer from all liability for injury to persons or damage to materials!

Before starting up the unit, always make sure it is in a closed and safe condition.

Only use dry compressed air for operation. If necessary, install an upstream water trap.

2.6 Operation

Never open the generator or converter housing while the Multipress is in operation.

There is a high voltage inside the units - risk of injury!

Avoid any potentially unsafe working practices.

Only operate the Multipress when all protective equipment and safetyrelated apparatus, e.g. detachable protectors, EMERGENCY STOP buttons, soundproofing, etc. are in place and in working order.

Failure by customers to order and use safety precautions such as the sound booth shall exempt the manufacturer from all liability for damage which could have been avoided by using the safety devices provided.

Before switching on the Multipress, make sure that no-one is endangered by the starting up of the machine.

In normal operation, the two-hand trigger button must be operated by the same person using both hands.

Bypassing this button by means of a third party or any other conceivable practice shall exempt the manufacturer from all liability for injury to persons or damage to materials!

Correct operation and careful handling of the units and their associated tools during operation will

- keep the system ready for service,
- prolong its useful life, and
- reduce stoppage times to a minimum.

2.6.1 Noise emissions

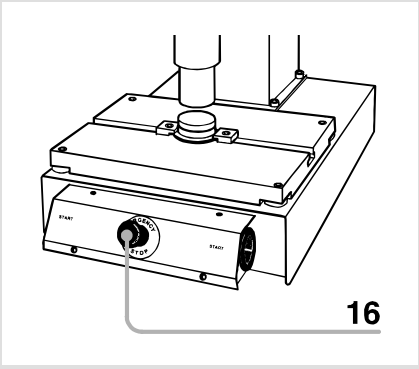
Limit values: according to current information, ultrasonics are harmless provided the maximum level is below 140 dB and the mean level, on an 8h/day basis, is below linear 110 dB.

Attention must be paid to the subharmonic, i.e. audible vibrations, which fluctuate widely according to the application and can have a very harmful and damaging effect. The limiting range is the energy-equivalent continuous sound level L_{eq} in relation to a representative working period (min. 8 h/day, max. 2000 h/year) of 85-87 dB(A).

From this limit value upwards, the staff at the workstation must be issued with ear protection, or a machine-specific sound-proofing device is necessary.

(Data according to SUVA-Information No 86048 d 4.94)

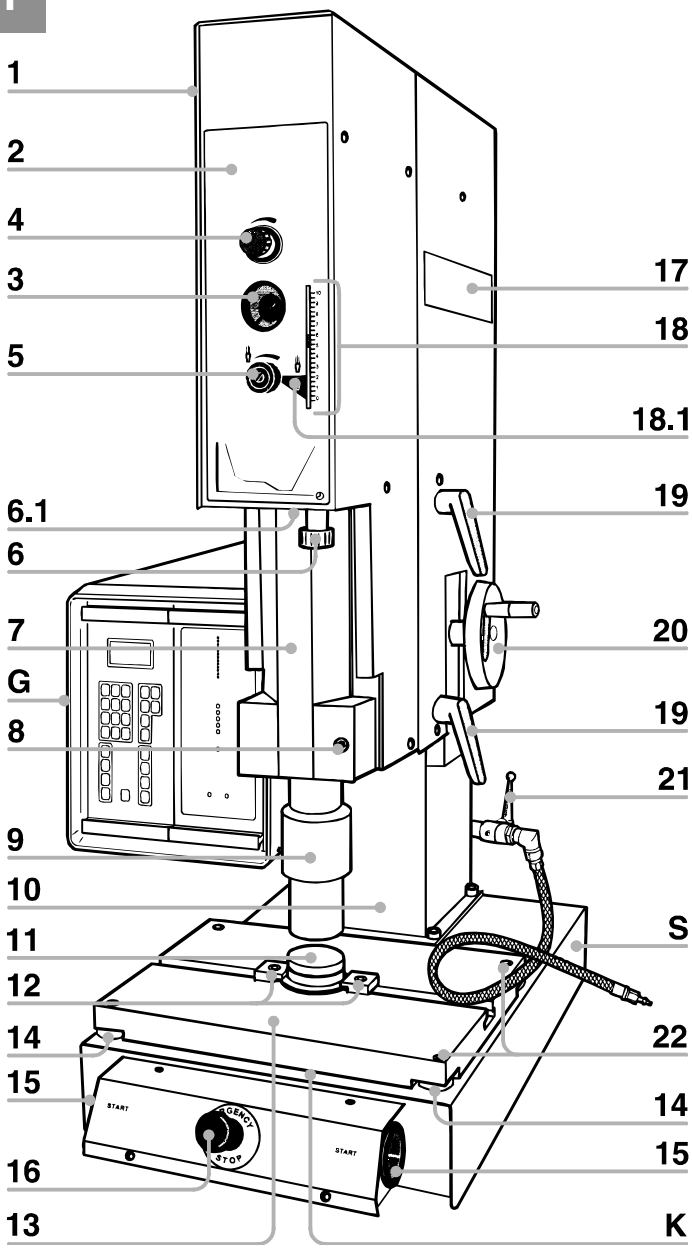
2.7 EMERGENCY STOP button



If there is an imminent risk of injury to the user or damage to the press:

- Push the EMERGENCY STOP button (16).
  - The press stops instantly and is disconnected from the mains voltage.

1



3 Product information

3.1 Product overview

3.1.1 Multipress

1 Metal panelling

2 Front panel

3 Pressure gauge

4 System pressure controller

5 Speed throttle

6 Vernier for depth stop

6.1 Clamping screw

7 Converter housing

8 Fastening screw for converter housing

9 Horn

10 Rectangular column

11 Fixture

12 Clamps

13 Clamping table

14 Adjusting nuts for parallel alignment

15 Dual safety switch

16 EMERGENCY STOP button

17 Name plate

18 Scale for feed

18.1 Trigger marking

19 Clamping levers for fixing the press head

20 Handwheel for rough fixing of the press head

21 Compressed-air hose tap and air hose with connecting branch

22 Clamping screws for clamping plate

G Generator

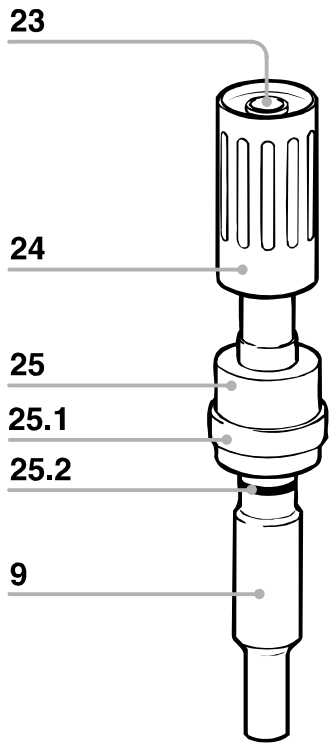
S Base

K Brief operating instructions

3.1.2 Vibration system

9 Horn
23 RF socket
24 Converter
25 Booster
25.1 Type designation
25.2 Booster designation

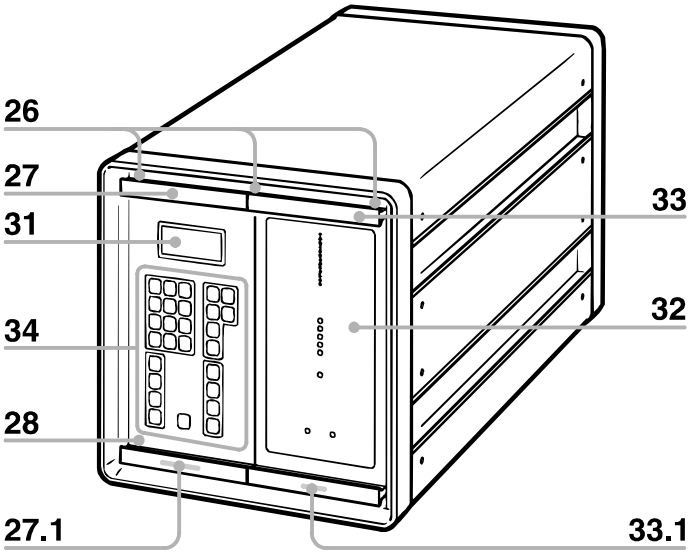
2



3.1.3 Ultrasonic generator

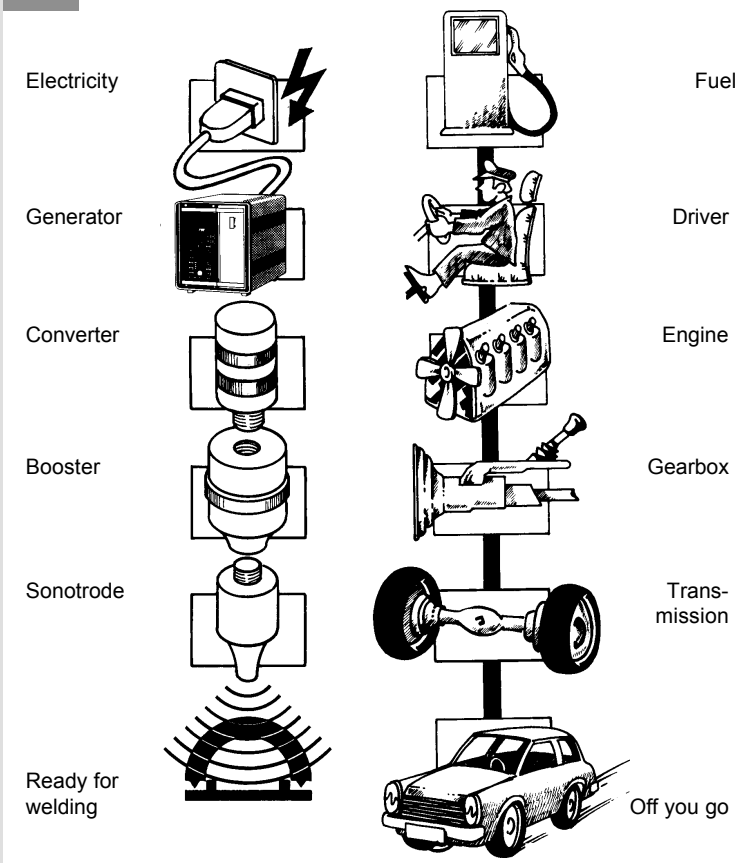
26 Fastening screws
27 PCS module handle
27.1 PCS module handle with model designation
28 PCS module
31 LCD Display
32 Generator module
33 Generator module handle
33.1 Generator module handle with model designation
34 Keyboard

3



3.2 Comparative example

4



3.3 Use of ultrasonics in the plastics industry

As you know, thermoplastics are available today in a large number of types and forms can be found in the most diverse products. The use of ultrasonic welding is therefore equally diversified. It covers all imaginable technical fields where plastic materials are processed in one way or another or where they find application as components.

3.4 Fundamentals and advantages of ultrasonic welding

Ultrasonic welding is an assembly process for the mass production of quality articles. Its great advantage is its economic efficiency.

Ultrasonics works without pollution and without foreign agents. Ultrasonic welding can therefore be recommended for use in sterile rooms, because there can be no pollution of surroundings by any additives.

A typical ultrasonics work cycle takes just a fraction of a second, with the melted weld solidifying again immediately after the welding operation.

This means that the workpiece is able to withstand loads and to be transported and further processed straight after the operation. No additional work is required.

An ultrasonic weld is produced with the material's inherent structure, i.e. without the addition of foreign agents such as adhesives, solvents, etc. This characteristic makes for an assembly process with a high level of automation convenience and productivity.

The energy requirement per welding operation is minimal. The efficiency of this modern ultrasonic welding system is approximatively 95%.

3.5 Mode of operation and characteristics of the Ultrasonic Multipress

The system created with the Multipress and the generator combines mechanical precision and strength with immense versatility.

At the same time we have been concerned to keep the unit as simple as possible in its operation and application.

The press can be adjusted in height by means of a handwheel (height adjustment mechanism) and can be moved precisely in a "dovetail" guide. The clamping table is aligned parallel to the horn face by means of an adjusting mechanism.

3.6 Warranty statement

With the delivery of this system RINCO ULTRASONICS AG acknowledges its warranty obligation in accordance with VSM (Association of Swiss Machine Builders).

Fulfilment of the terms of this warranty by RINCO ULTRASONICS AG shall be conditional, however, on a number of requirements, for example:

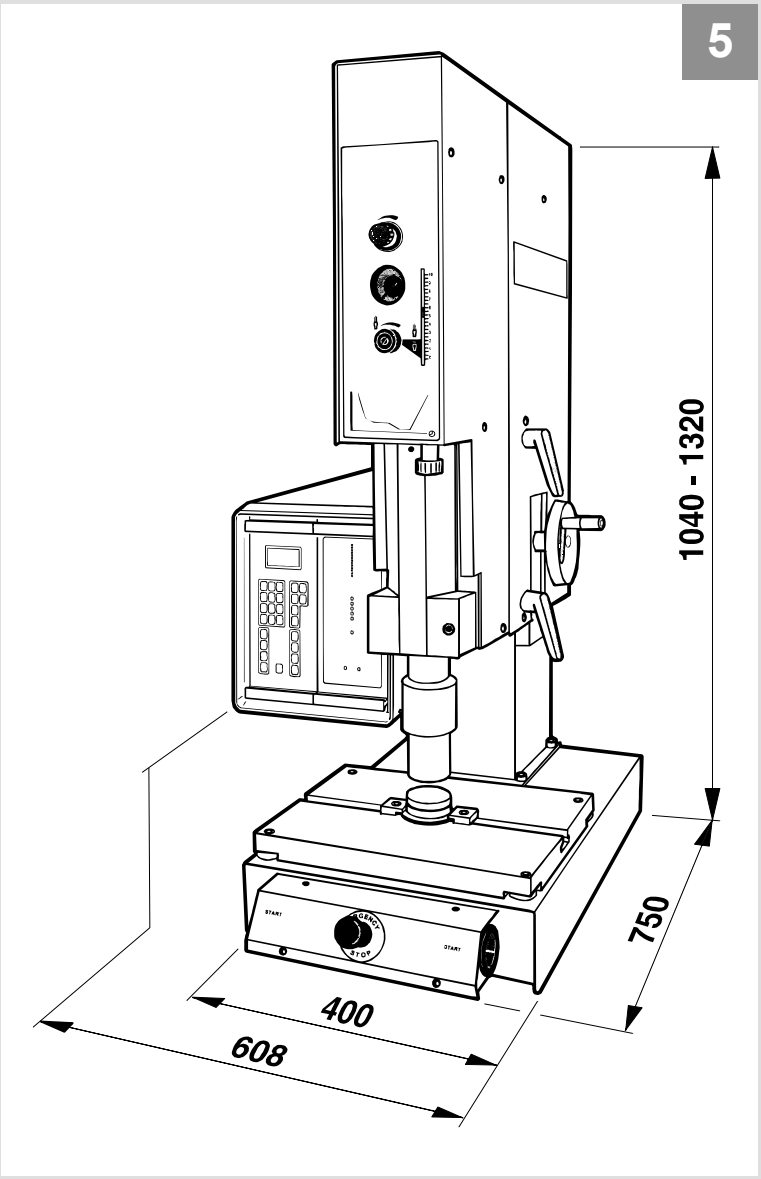
The user must be familiar with the contents of this Operating Manual.

The instructions and warnings contained in this Operating Manual must be observed.

Unauthorized conversions or modifications to parts of the press and generator are prohibited.

RINCO ULTRASONICS AG shall be glad to clarify any unlcear points on the phone or to provide instruction by capable specialists.

3.7 Technical data of the Multipress



Dimensions in mm

Weight:
incl. PCS-Generator: ..... 103 kg

3.7.1 Actuator

- Tool travel max.: ..... 100 mm
- Force at 6 bar: ..... 3'000 N
- Travel measuring system (optional)
- Adjustable depth control stop with vernier.
- Precision cross-roller guide on the feed slide.
- Depth stop with vernier and scale.
- Double-acting cylinder, damping possible in every position.
- Switch for cylinder home position.
- Dynamic sensor to trigger ultrasonics (adjustable according to force).
- Piezoelectric converter.
- Threaded coupling for horn: M12

3.7.2 Booster

Reducing Booster	Color	Material	Booster	Color	Material
1 : 0.5 1 : 0.6	blue violet	Aluminium Aluminium	1 : 1 1 : 1.5	green yellow	Aluminium Aluminium
other ratios on request			1 : 2 1 : 2.5 1 : 3	white black brown	Titanium Titanium Titanium

3.7.3 Base

- Ribbed steel construction.
- Tool clamping plate with tee slot and parallel alignment mechanism.
- Dual safety switch with emergency stop button.

3.7.4 Compressed air

- Dry compressed air, 7 bar max. (105 PSI).

3.7.5 Dimensions

- see fig. page 3-6.

3.7.6 Weight

- Weight ..... 92 kg

3.8 Technical data of the Ultrasonic Generator

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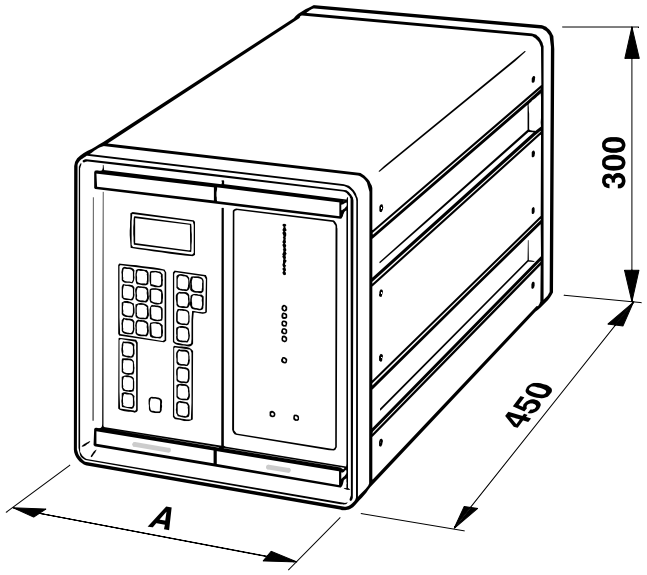


Power	A	Weight
1'000-1'500 W 2'000-3'000 W	260 300	11 kg 15 kg

Dimensions in mm

3.9 PCS Control

3.9.1 Concept

- Flexible modular system with various insertable modules.

3.9.2 Display

- 4-line alphanumeric LCD display.

3.9.3 Data Entry

- Keyboard with numerical keys and 14 function keys.

3.9.4 Operating Modes

- Time
- Energy
- Travel

3.9.5 Time Mode

- Constant Time with energy limits.

3.9.6 Energy Mode

- Constant energy with time limits.

3.9.7 Travel Mode

- Constant travel distance with energy limits.

3.9.8 Ultrasonic Actuation

- Using a trigger sensor or through the travel mode.

3.9.9 System Test

- Can be selected to be carried out before or after each weld.

3.9.10 Control Voltage

- 24 V DC

3.9.11 Menus

- Menus can be selected to appear in German, English, French, Italian or in Spanish.

* PCS II options

3.9.12 Databank*

- 40 sets of welding parameters can be stored in the databank.

3.9.13 Interface*

- RS 232 interface for a printer or for SPC data aquisition.

3.9.14 Generator Modules Available

Model	maximum power output
GM 20-1000 PCS GM 20-1500 PCS	1000 W 1500 W
PIM 20-2000 PIM 20-3000	2000 W 3000 W

3.9.15 Connected loads

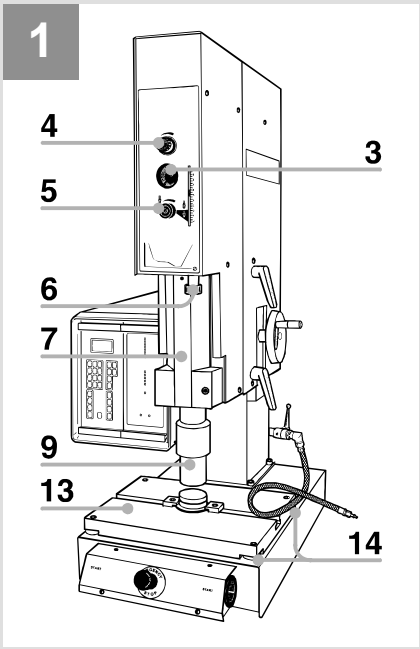
- 230 V 50-60 Hz
- Maximum current consumption: ..... 16 A

6

3.9.16 Dimensions

- see Fig. page 3-8

1



5 Controls and indicators

5.1 Multipress

3 Pressure gauge

The pressure gauge shows the set maximum welding pressure.

4 System pressure controller

The system pressure controller serves to adjust the welding pressure. To set the nominal value, pull out the setting knob and push it in again to fix it in the required position.

Maximum inlet pressure: ..... 7 bar

5 Speed throttle

The speed throttle enables the lowering speed of the feed cylinder to be continuously adjusted over the last 30 mm from the home position. The speed of the return stroke is not adjustable!

6 Vernier screw for the depth stop

The distance between the horn face and the fixture can be continuously adjusted by means of the depth stop with scale ("0.1mm" increments).

7 Converter housing

The converter housing contains the vibration system with the electrical supply leads.

9 Horn

Never alter tuned horns by machining. This can cause subsequent damage to the vibration system and to the generator!

The horn is the actual welding tool; it has been tuned to the resonance frequency by the manufacturer.

13 Clamping table

The integrated T-slot enables rapid centering and fastening of the workpiece mount with the supplied clamps.

14 Parallel adjusting nuts

The parallel adjusting nuts allow an extremely exact alignment of the clamping table (13) and hence the alignment of the fixture in relation to the horn face.

15 Dual safety switch

The welding cycle is triggered manually by pressing the two buttons simultaneously. The two buttons must be actuated within 0.3 s of each other.

This ensures that the operator is unable to reach into the area of the tool during the welding operation.

This precaution serves the interests of safe operation and may not be removed or modified in its construction!

Observe any statutory safety regulations in force in your country!

Failure to observe these regulations will exempt the manufacturer from all liability for injury to persons or damage to materials!

16 EMERGENCY STOP button

Pressing the EMERGENCY STOP button stops the press immediately.

The complete power supply is interrupted.

After pressing the EMERGENCY STOP button, it remains lokked.

- To unlock the EMERGENCY STOP button:
  - Pull the head of the button upwards into its initial position.

18 Scale for feed

Scale for reading and setting the actuator.

18.1 Trigger marking

If the trigger marking is passed, the safety switch is activated. The cycle now continues automatically without the dual safety switch being held in.

19 Clamping levers for fixing the press head

Clamping device for fixing the press head after rough adjustment.

20 Handwheel for height adjustment

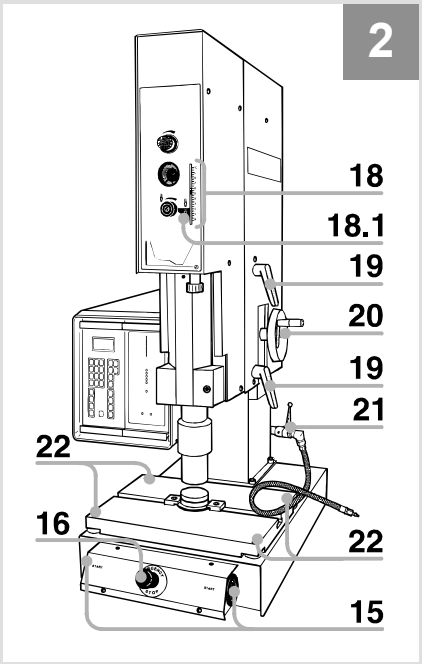
The handwheel is used to adjust the height of the press head. The handle of the handwheel can be swung in.

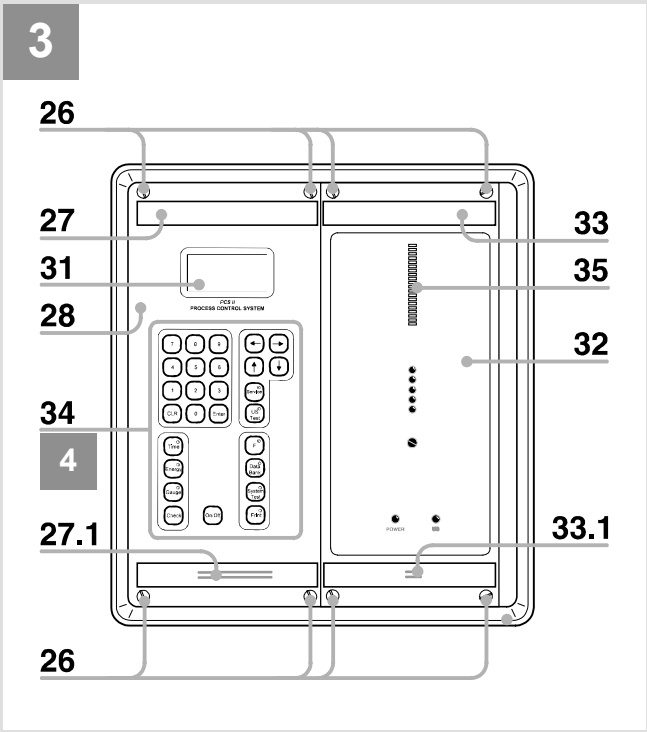
21 Compressed air connection valve

Connection valve for joining up the unit's compressed air system to the local compressed air network. The valve serves to separate the energy between the local compressed air network and the unit's compressed air system.

22 Clamping screws for clamping plate

Socket setscrews for releasing and fastening the clamping table for parallel alignment.





5.2 Ultrasonic Generator

26 Fastening screws

27 PCS module handle

If necessary, you can pull out the generator module by holding these grips. The fastening screws (34) for opening the generator module are located above and below the grip bars.

The generator module is never to be pulled out or plugged in while mains is connected. (high voltage)

27.1 PCS module handle with model designation

28 PCS module

31 LCD display

32 Generator module

33 Generator module handle

33.1 Generator module handle with model designation

34 Keyboard

35 LED display

The display shows the power delivered during the welding procedure. A power level of 25% should not be exceeded when the sonotrode is not loaded.

If a value of 100% is exceeded, an error message appears.

5.3 Elements of the Operator's Panel

31 4-line LCD Display

37 Numerical Keyboard

38 CLR Key

39 Time Key

40 Energy Key

41 Gauge Key

42 Check Key

43 Power Switch

44 Cursor Keys

45 Service Key

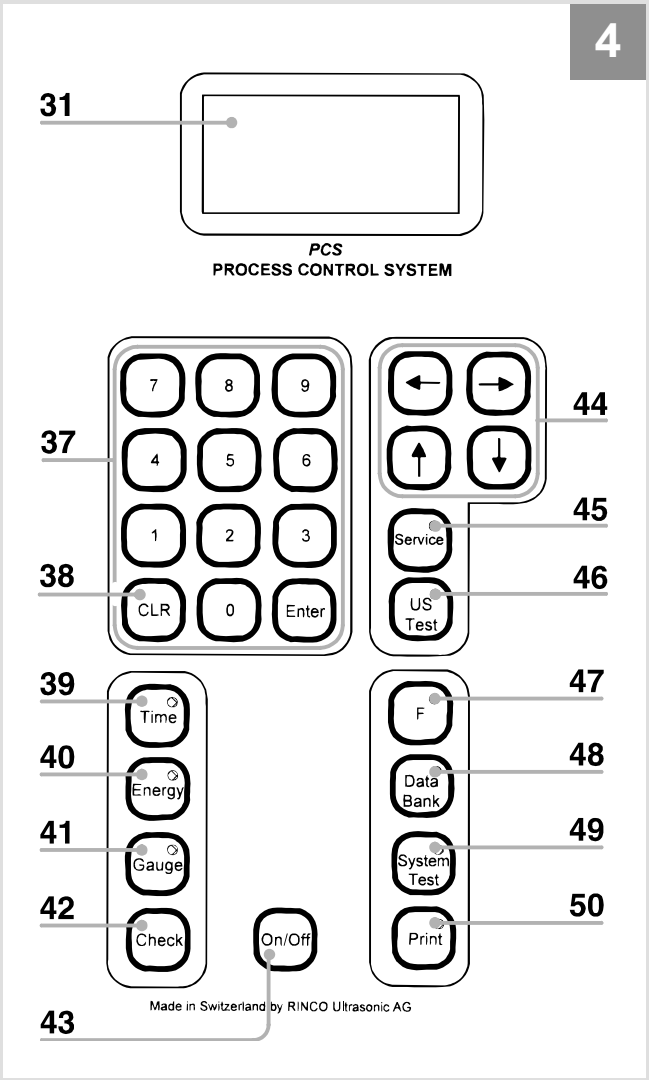
46 US-TEST Key

47 F Key

48 Data Bank Key

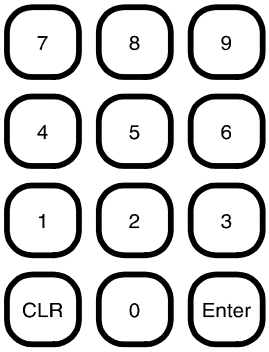
49 System Test Key

50 Print Key

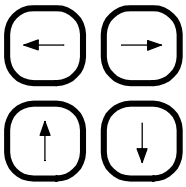


4a

4b



4c



5.4 Description of the Display and Keyboard

31 The Display 4a

After turning on the machine, the control unit carries out a self-test. The manufacturer's address and the software version are displayed. After 3 seconds, the control is switched to the current welding mode.

The welding parameters, messages and machine settings are displayed.

The display is equipped with a background light. To increase the life span of the light, it is automatically turned off 5 minutes after the last key has been pressed. The light switches back on again as soon as any key is pressed.

37 The Numerical Keyboard 4b

Using the ***0-9***, ***Enter*** and ***CLR*** keys, certain welding data can be changed depending on the operating mode selected. When the ***Enter*** key is pressed, the value entered is checked and stored. If the value lies outside of the valid range for the value, then the previous value is redisplayed.

44 The Cursor Keys 4c

Using the → and ← cursor keys, a certain value within a numerical range can be selected. The border values are automatically set by the number of digits.

Using the ↑ and ↓ cursor keys, you can jump to a different line. As the number of lines in the display is limited to 4 lines, the lowest line in the display is overwritten each time a new line of data is displayed.

All numerical data is entered as follows unless stated otherwise:

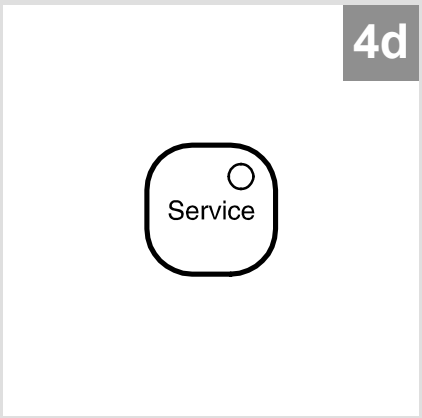
1. Place the cursor on the desired parameter line using the ↑ and ↓ keys.
2. Enter the value desired using the numerical keyboard.
3. Finally, press the ***Enter*** key.

4d

45 The Service Key

After pressing the ***Service*** key, you are requested to enter a code. Code ***23*** releases the machine so you can adjust the settings (unlock). The welding parameters can now be changed. To activate the feed without ultrasonics, the ***Service*** key must be pressed a second time. The feed can then be dropped down by pressing the dual safety switch. As soon as the activation mark is passed over, the switch can be released. Pressing the start key after that will return the feed back to its original position.

The setup operation is ended by pressing the ***CLR*** key (lock).



4e

46 The US-TEST Key

The current sonotrode frequency and its power loss can be displayed using the ***US-TEST*** key.

The key must be pressed until the value in the display does not change anymore. The US-Test is automatically stopped after 5 seconds.

The vibration system must be connected.

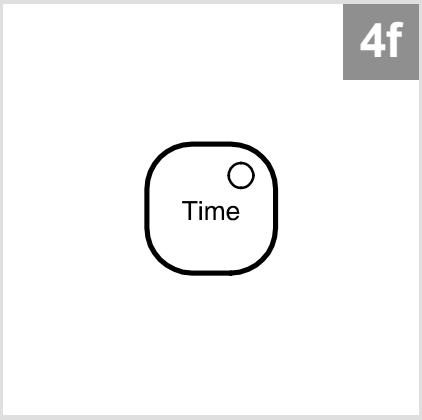
Do not touch the sonotrode !

4f

39 The Time Key

The ***Time*** key activates the time mode.

The possible functions of the time mode are explained starting on page 7-6.

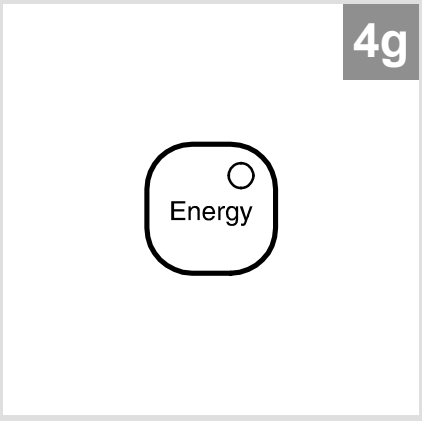


4g

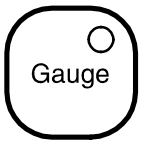
40 The Energy Key

The ***Energy*** key activates the energy mode.

The possible functions of the energy mode are explained starting on page 7-12.



4h



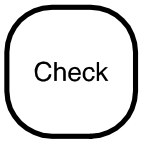
41 The Gauge Key

4h

The ***Gauge*** key activates the travel mode.

The possible functions of the travel mode are explained starting on page 7-18.

4i

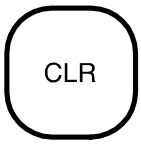


42 The Check Key

4i

- Using the ***Check*** key, you can place the cursor at the beginning of the current menu.
- Using the ***Check*** key, you can reset the error relay.

4k



38 The CLR Key

4k

Using the ***CLR*** key, you can

- reset and clear error messages.
- reset input values.
- select fixed input values.

4l

49 The System Test Key

The vibration system currently connected can be tested using the ***System Test*** key.

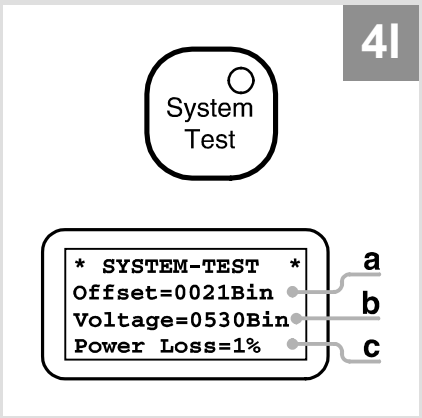
The vibration system must be connected.

Do not touch the sonotrode !

a Offset of the A/D converter

b Converter voltage

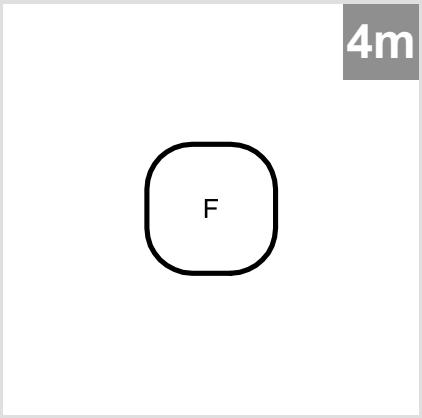
c Converter power loss



4m

47 The F Key

The parameter menu is activated using the ***F*** key. After entering a code, you can adjust the machine parameters.



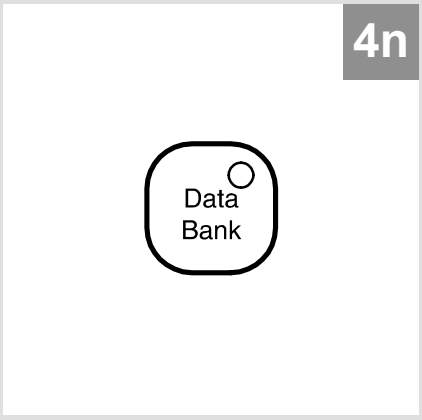
4n

*48 The Data Bank Key**

The databank administration functions are activated using the ***Data Bank*** key.

Welding data can be stored, selected, deleted or printed out.

The possible functions of the data bank mode are explained starting on page 7-38.

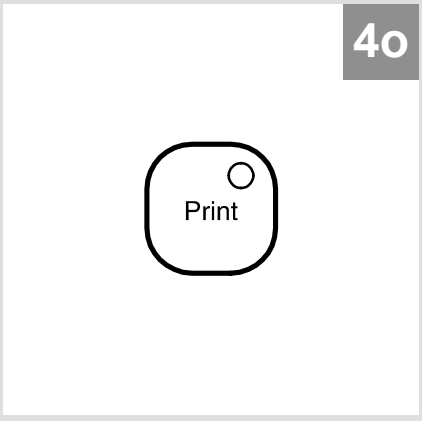


4o

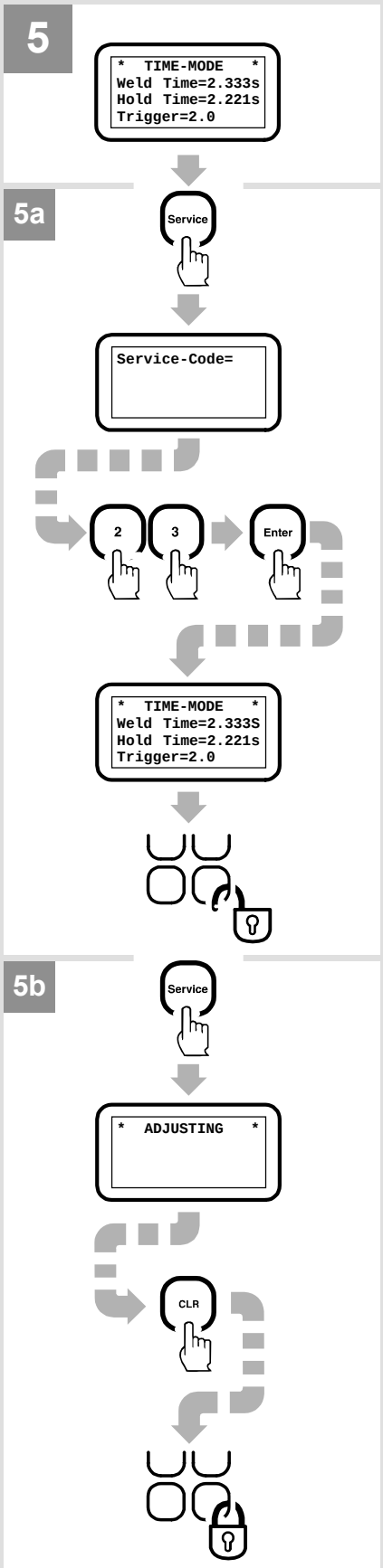
*50 The Print Key**

The ***Print*** key activates the print menu. Welding data can be printed out.

The possible functions of the print mode are explained starting on page 7-34.



* only for the PCS II



5.4.1 Important Information

To protect the welding parameter settings from unwanted changes, all of the important key functions should be locked after turning on the machine.

After turning the machine on, the display shows the operating mode which will be used during actual welding.

5.4.2 Releasing the Keyboard Lock

5a

1. Press the ***Service*** key.

The display switches to the code input request mode.

2. Enter the number "23" using the numerical keyboard and confirm the data entered by pressing the ***Enter*** key.

The display then returns to the previous operating mode display.

The keyboard is now unlocked and can be used to enter data.

5.4.3 Activating the Keyboard Lock

5b

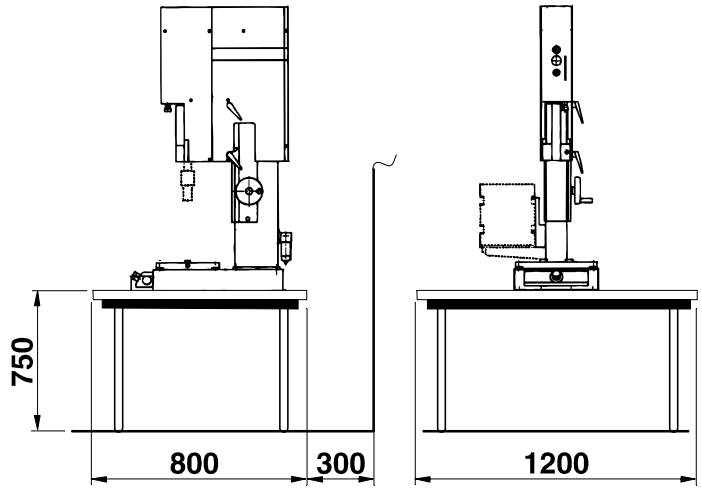
1. Press the ***Service*** key again.

Display.

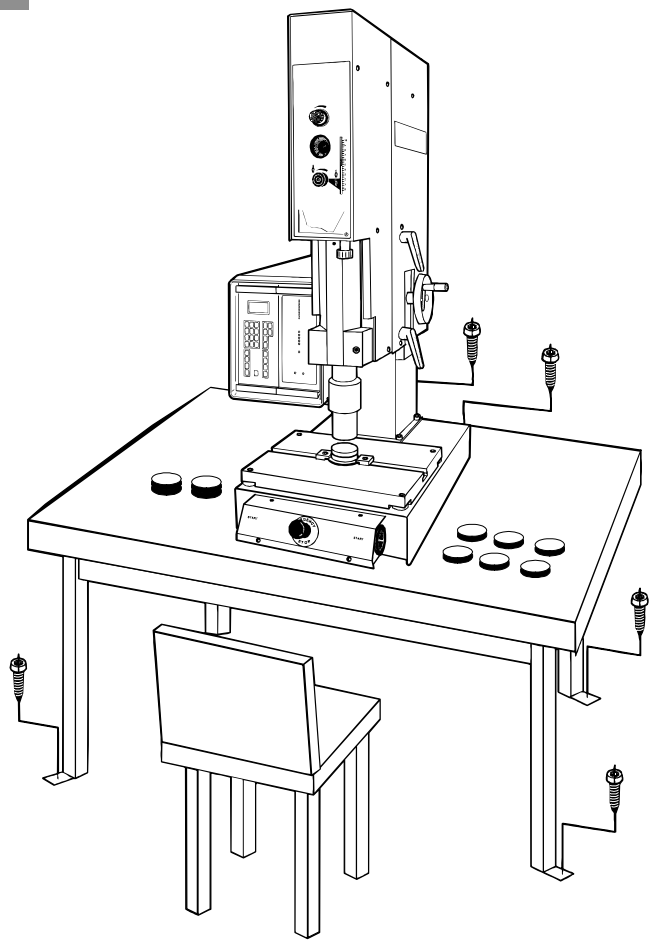
2. Press the ***CLR*** key.

The keyboard is now locked again.

1



2



6 Initial start-up

6.1 Selecting a location

Choose a location that fits the following criteria:

- Clean surroundings
- A level and solid standing surface
- Vibration-free seating for the electronic units
- Ambient temperature:
  in operation: ..... 10 °C - 45 °C
  for adjustments: ..... 20 °C

6.2 Space requirement

The location chosen for the press should provide enough room for carrying out maintenance and repair jobs.

Minimum dimensions for the place of installation see Fig.1.

1

6.3 Work station

The sketch shows an example of how a work-station can be arranged.

2

6.4 Assembling and connecting up the units

To prepare the units for operation, carry out the following steps:

2

1. Anchor the work bench and screw the Multipress to the rear as shown in Fig.2.
2. Connect up the cables between the press and generator.

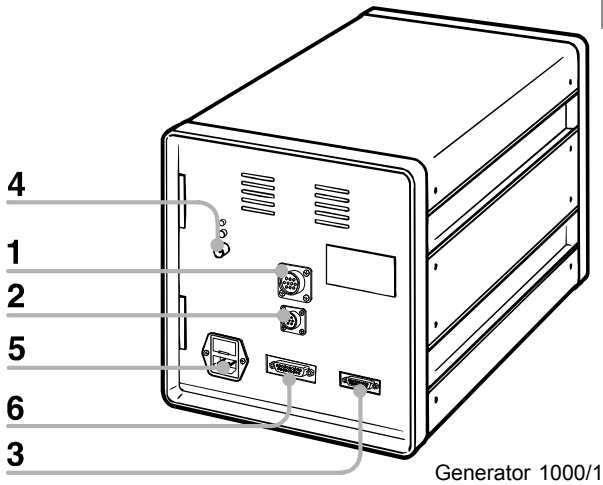
Be sure to fit the power connection with a grounded connector.

3

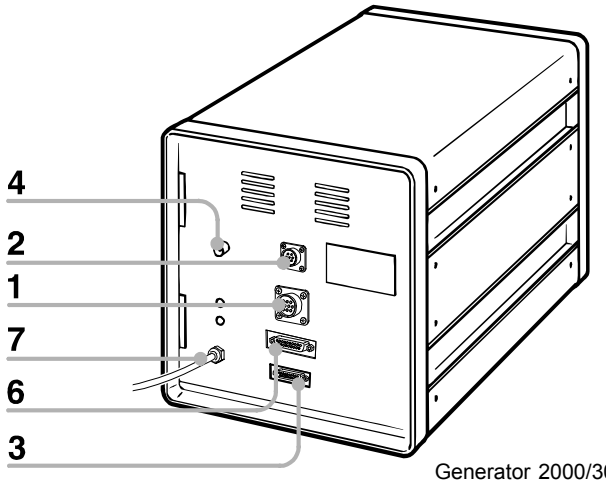
3. Plug the unit plugs in the sockets of the Generator:

1 STO1 Actuator
2 STO2 Start (optional)
3 STO3 Interface (optional)
4 STO4 Converter connection
5 STO5 Power connection
6 STO6 RS 232 (Option)
7 ST6 Mains cable

3



Generator 1000/1500W



Generator 2000/3000W

Compressed air connection: 7 bar maximum.

Turn compressed air valve (21) to vertical position (closed).

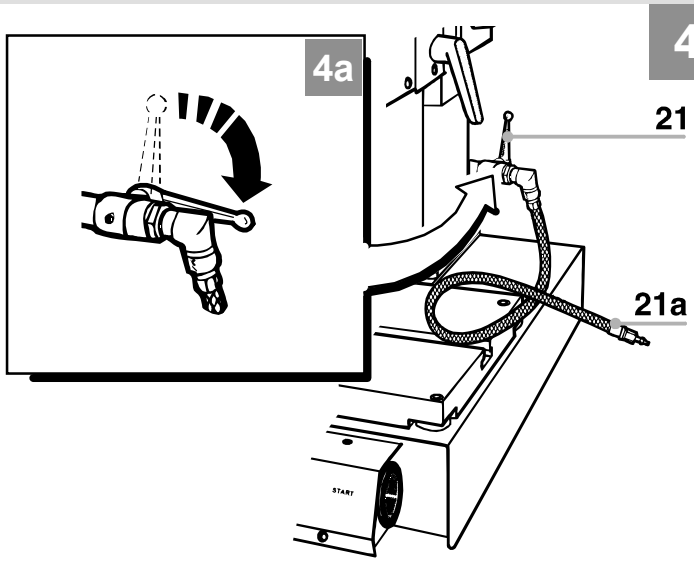
4

4. Connect compressed air tube (21a) to the available compressed air network.

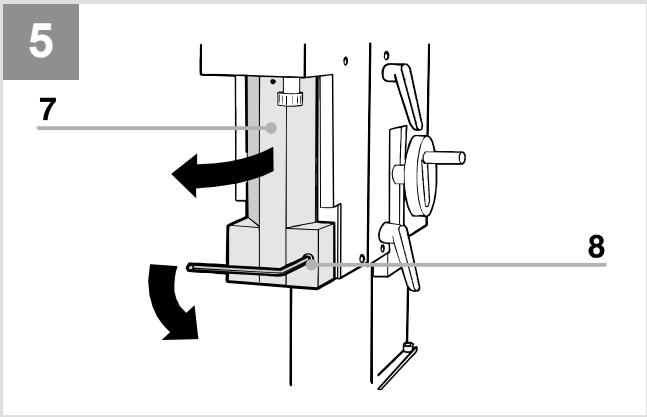
4a

5. Move compressed air valve (21) to working position (Fig. 4a).

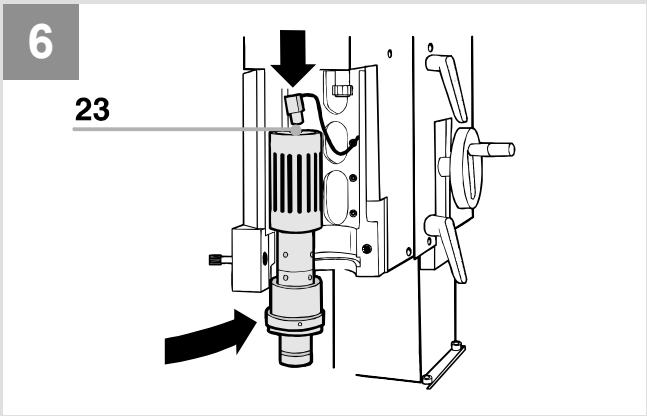
4



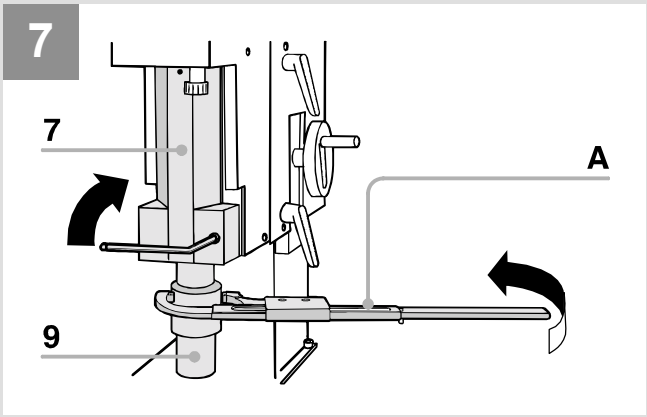
5



6



7



6.5 Installing the vibration system

Make sure you switch off the voltage supply at the generator before installing the vibration system (Power OFF) !

1. Release the screw (8) with the socket wrench supplied (size 6 mm). 5
2. Open the cover (7) of the converter housing.
3. Plug the RF plug into the RF socket (23) of the converter. 6
4. Insert the vibration system into the converter housing from the front.
5. Re-close the cover (7) of the converter housing and fasten it with the socket wrench. 7
6. Screw in the horn (9) and tighten it with the special wrench supplied (A).

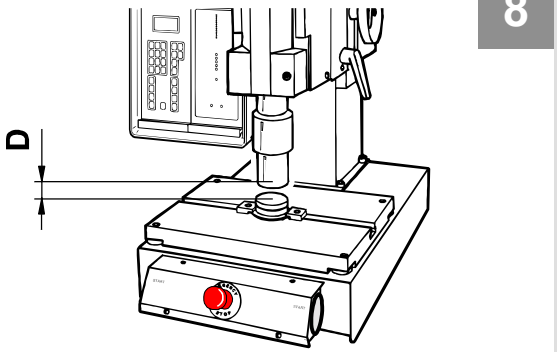
Tightening torque: 30-40 Nm

The vibration system is now ready for operation.

6.6 Setting up

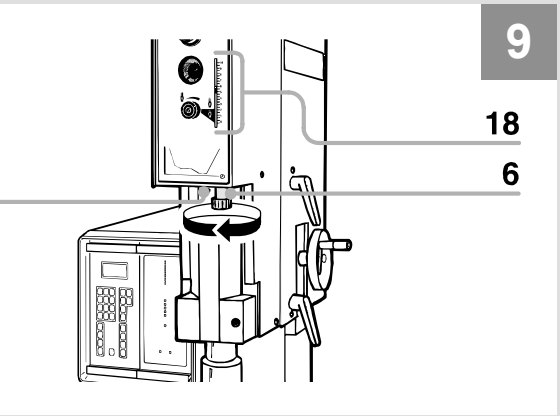
8

1. Position the locating fixture with inserted welding object.
2. Measure stroke distance "D".



9

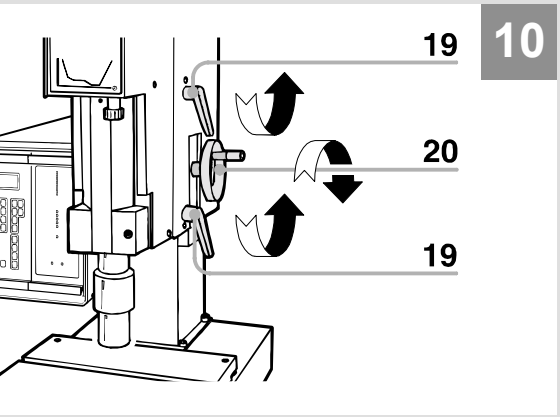
3. Loosen the knurled screw (6.1) and adjust the stroke with the depth stop (6); check on the scale (18).
4. Fasten the knurled screw again.



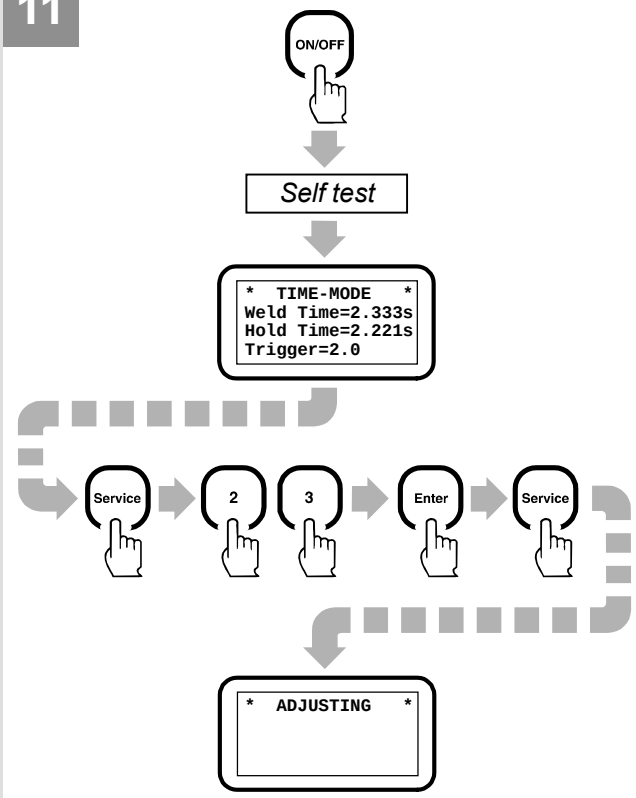
10

5. Release the clamping levers (19) and move the press upwards by means of the height adjustment facility (20), so that the horn cannot collide with the welding object when the stroke is performed.
6. Tighten the clamping levers again.

Attention: if the horn is not positioned high enough, there will be a risk of collision!



11



Do not touch the sonotrode ! 11

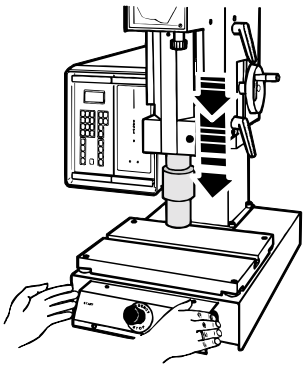
7. The machine is turned on using the ***"ON/OFF"*** key.

8. The current welding mode is shown in the display after the self-test has been completed.

9. By pressing the keys
   - ***Service***,
   - ***2***, ***3***,
   - ***Enter***,
   - ***Service,***

   you enter the " * ADJUSTING * " mode.

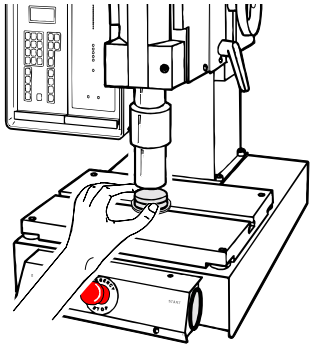
12



Do not place work locating fixture with welding object under the horn. 12

10. Actuate dual safety switch to lower press.

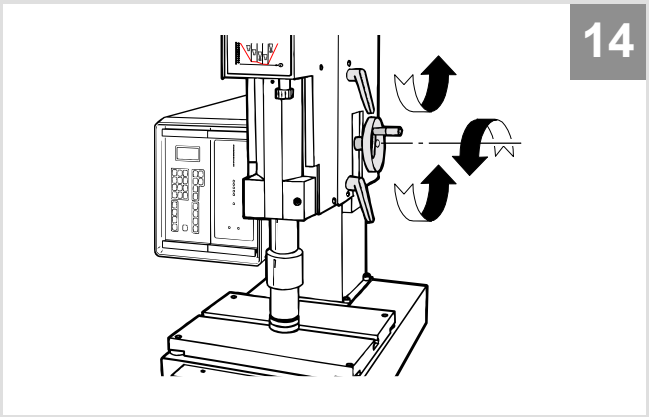
13



11. Center the fixture containing the object to be welded under the horn. 13

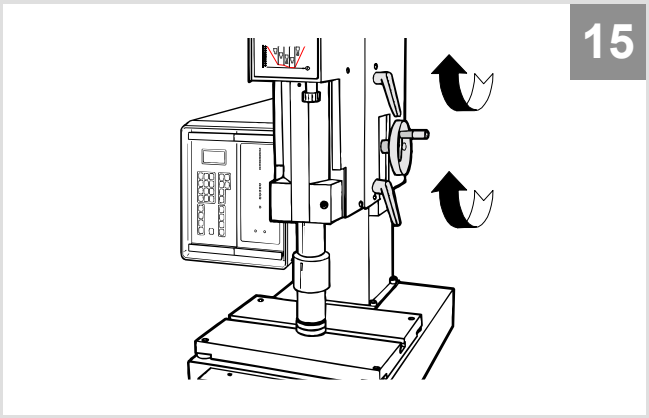
14

12. Release clamping levers and lower the press **gently** onto the object to be welded using the height adjustment facility.



15

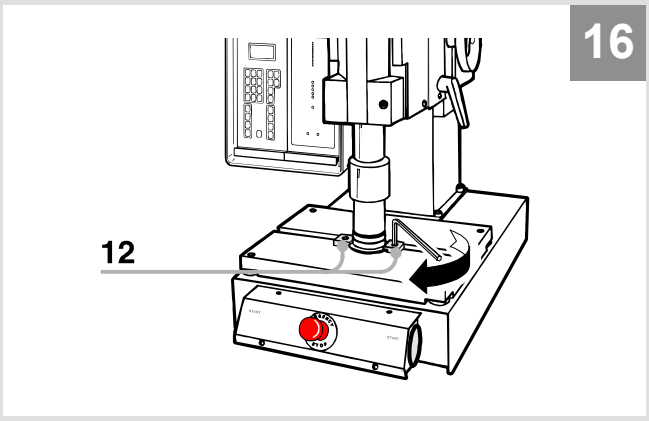
13. Tighten clamping levers.



16

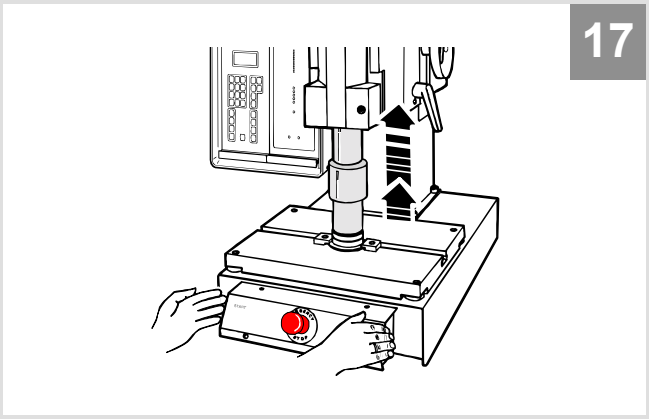
14. Fasten clamps (12) using the socket wrench supplied.

15. First tighten both sides slightly, checking to see if the centering is still correct, then tighten fully.

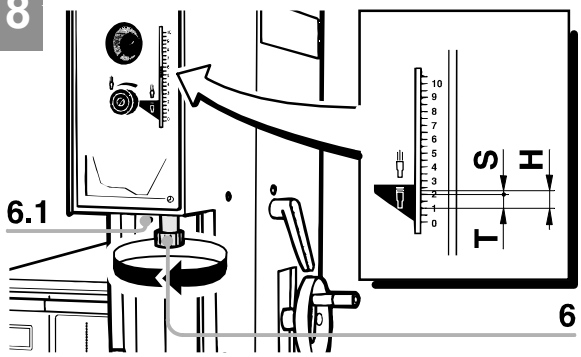


17

16. Move press to upper neutral position using the dual safety switch.



18

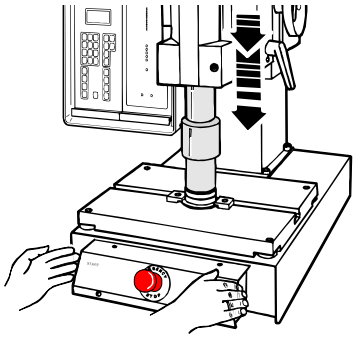


17. Release knurled screw (6.1) and raise depth control stop by the approximate weld depth (S) by turning to the left.

18. Lock the stop with knurled screw (6.1).

18

19

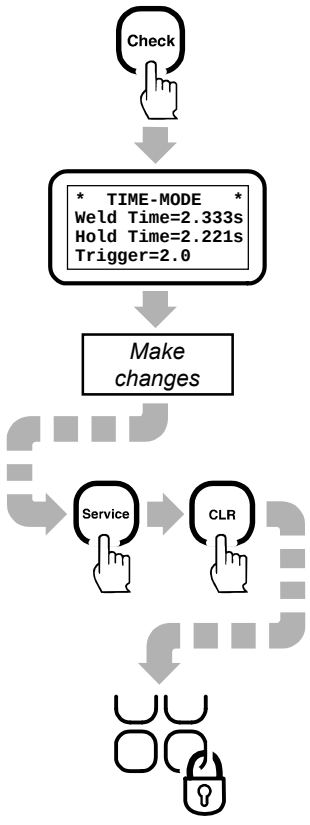


19. When the press is lowered again, the centering of the part is checked.

19

Attention: the horn should not touch the fixture when the press is lowered if there is no workpiece in place.

20



20. You display the current welding mode by pressing the ***Check*** key. The welding parameters can now be adjusted.

20

21. After having successfully determined the welding parameters, you should lock the control panel again. This is done by pressing the ***Service*** key, followed by pressing the ***CLR*** key. The welding paramters cannot be changed anymore after these keys have been pressed.

6.7 Aligning the clamping table

The clamping table (13) was aligned parallel to the horn face in the factory.

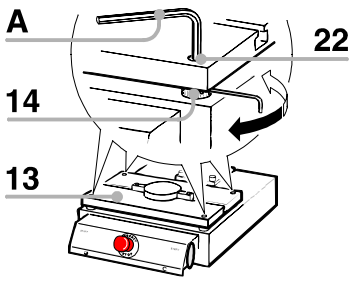
Should the clamping table need readjusting, however, it can be aligned using the four parallel adjusting nuts (14).

***Parallel adjustment**:*

21

1. Release setscrews (22) using socket wrench (A).
2. Set parallel adjusting nuts (14) according to requirements, as shown in the illustration.
3. When the adjustments are completed, re-tighten the setscrews (22).

21



6.8 Determining the welding data

Ultrasonic welding requires a knowledge of the interrelationships between the individual functions. Since the functions of the various elements interact, it is important for them to be exactly coordinated.

Objects which require welding vary so much in their properties, in the geometry of their parts, in their materials and in their surface conditions that it would be quite inadequate to determine the welding parameters once only. These need to be determined anew for each object to be welded.

The most important variable settings of the ultrasonic welding unit are:

- Amplitude
- Contact force
- Welding time
- Triggering
- Lowering speed

It is quite possible to achieve identical welding results with different settings, e.g.:

- high contact pressure and short welding time, or
- long welding time and low contact pressure.

Recommendation:

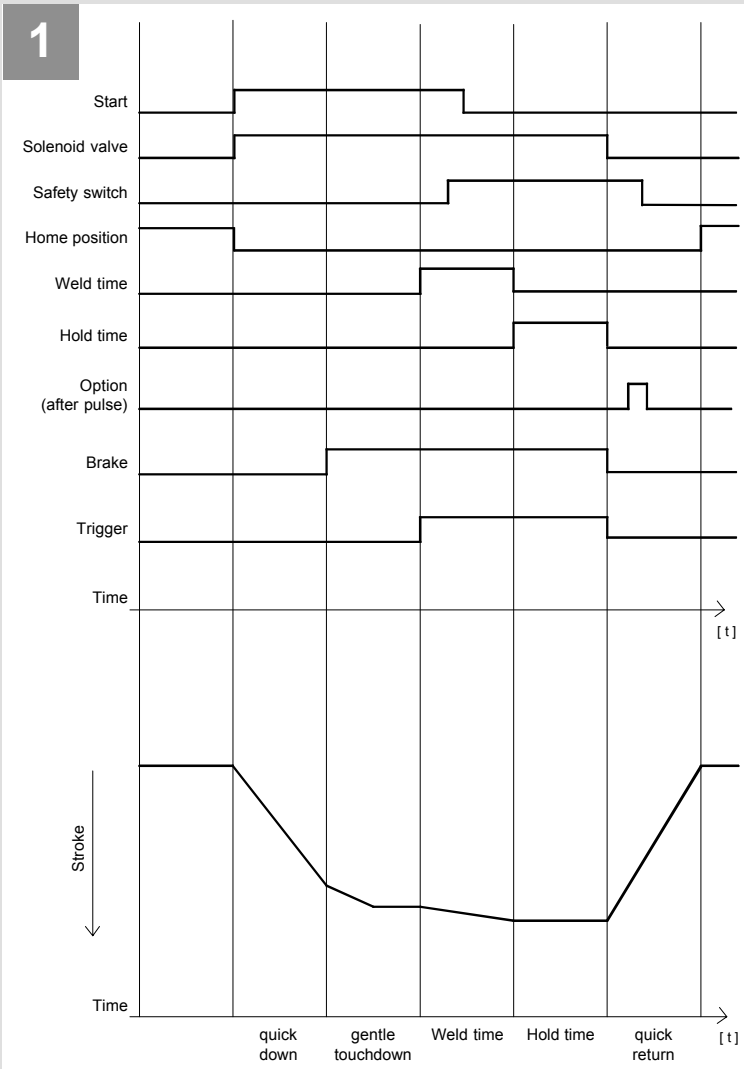
To be able to achieve successful results repeatedly, note the established setting parameters in a set-up log.

Do not change several settings simultaneously because they will influence each other. This makes it more difficult to keep track of adjustment steps.

6.9 Switching off

1. Switch off the generator with the "ON/OFF" key.
2. Move the compressed air lever to the vertical position (closed).

1



7 Operation

7.1 The welding operation sequence

7.1.1 Weld cycle

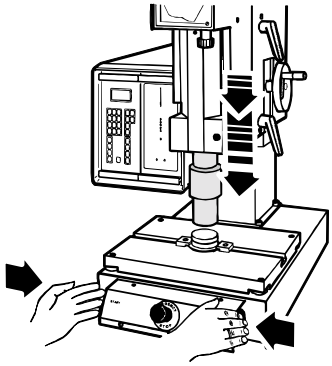
7.1.2 Work cycle

2

1. Press both start buttons within 0.3 seconds to start the cycle.

The power loss of the vibration system is measured over a period of 0.3 seconds (system test). The solenoid valve is activated and the feed drops down.

2

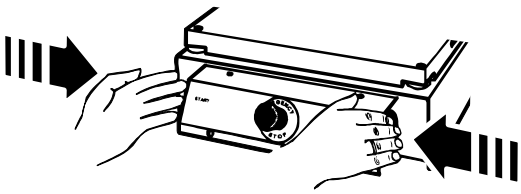


3

2. Keep the start buttons actuated until safety switch is reached or until hold time is ended.

If start buttons are released too early, the actuator moves back to the home position. An error message appears.

3

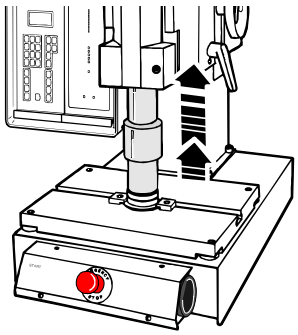


4

Welding is actuated by the *TRIGGER*. As soon as the welding and hold time have run out, the actuator moves back to the home position.

Options: US-STOP
AFTER-PULSE

4



7.1.3 Optimization

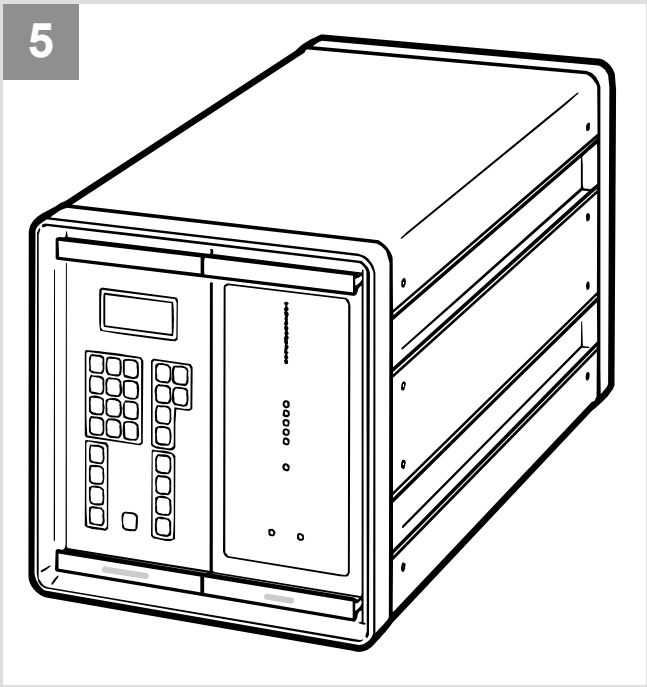
To optimize the welding operation:

- only ever change one setting at a time
- assess the welding results after each changed setting.

Never change several settings simultaneously!

When several settings are changed simultaneously, it is very difficult to establish which changes have actually affected the welding results.

5



7.2 Operating the PCS Controller

7.2.1 The Operating Modes

A PCS- controlled ultrasonic welding machine offers a high degree of flexibility with respect to its use for welding plastic parts.

There are basically three different operating modes for the PCS controller which can be selected by pressing a button:

a) constant time
b) constant energy
c) constant travel*

*** The press must be equipped with a travel measuring system.**

The choice of the operating mode is highly dependent on the welding application.

For a new user to become more familiar with the various operating modes, it is easiest to start with the "time" operating mode.

It is also advantageous to test the welding procedure on new parts while operating in this operating mode. The experience obtained while welding in this operating mode can be applied and expanded to the other operating modes.

The Applications Technology Laboratory of the RINCO company is available for any questions you may have.

7.3 The TIME Operating Mode

The time operating mode is the traditional operating mode for ultrasonic welding equipment.

The welding time is held constant in this operating mode.

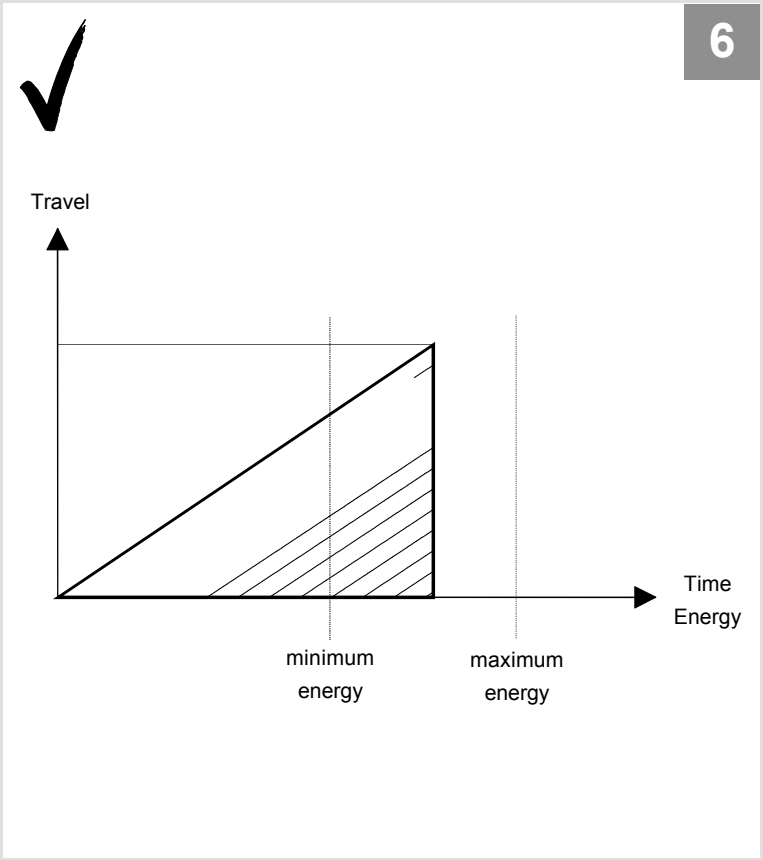
A minimum and a maximum energy limit can be set.

The amount of energy made available for welding can vary within the limits of a certain range. The rangeis affected by the tolerances of the parts to be welded. It may happen that small variations can be found on the welded parts.

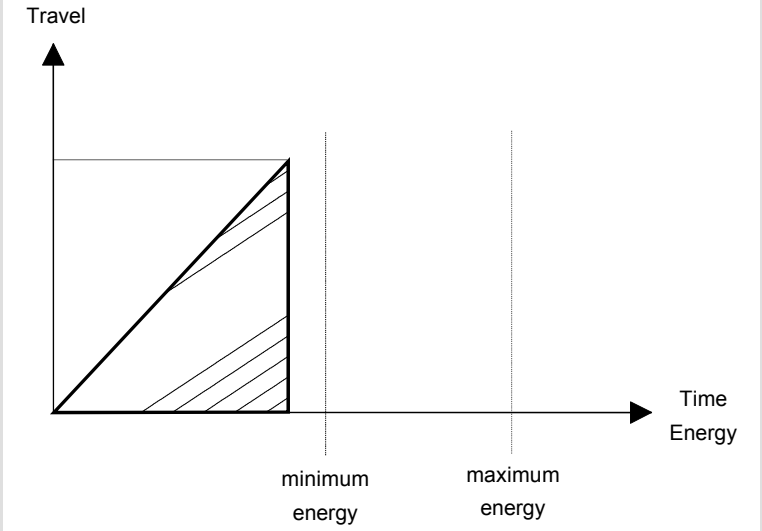
7.3.1 The Energy Range in the TIME Mode

Correct welding

The welding energy must remain within the set limits. If these limits are exceeded, an error message is displayed.



7



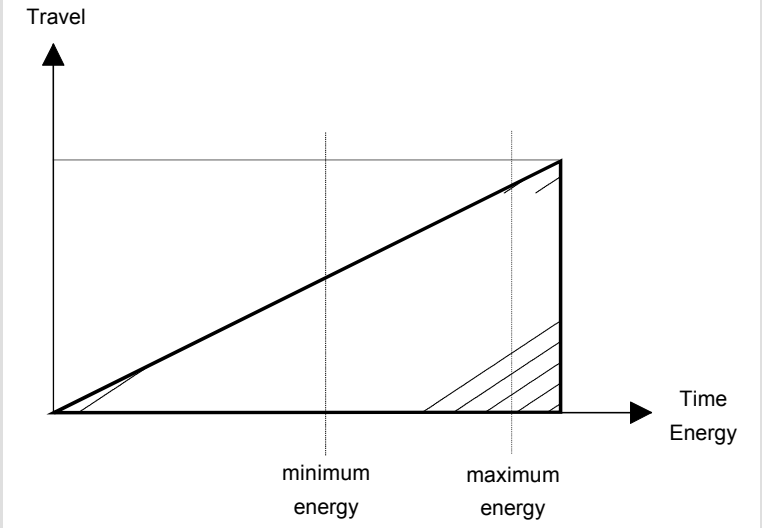
Energy is too low

If the minimum amount of energy is not reached, then the error message "Energy too low" is displayed.

Possible causes are:

- welding time is too short
- system pressure is too low
- amplitude too low
- object to be welded is not in the fixture
- object to be welded is defective

8



Energy too high

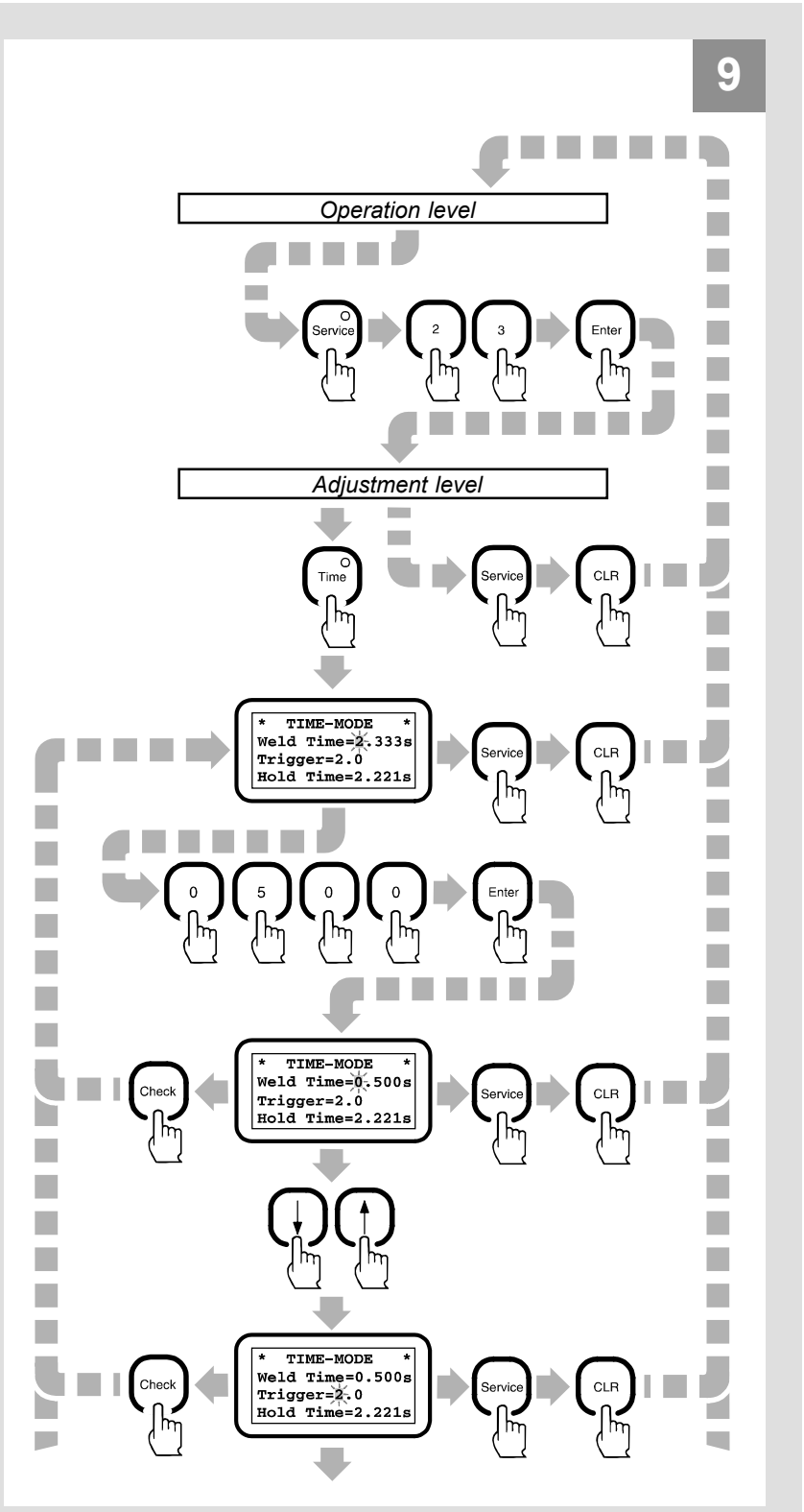
If the amount of energy exceeds the maximum energy limit, then the error message "Energy too high" is displayed.

Possible causes are:

- welding time too long
- system pressure too high
- amplitude too high
- object to be welded is defective

7.3.2 Overview of the TIME Mode Functions

End each entry of new data by pressing the "Enter" key.



7.3.3 Parameters of the TIME Operating Mode

Parameter Display	Designation	Adjustment Range	Function[1)]
Weld Time=	Welding time	0.010 - 9.999 s	Parameter
Trigger=	Ultrasonic trigger	0.0 - 9.9	Parameter
Hold Time=	Hold time	0.000 - 9.999 s	Parameter
Amplitude=	Amplitude*	60 / 70 / 80 / 90 / 100	Parameter
En.max.=	Maximum energy	0 - 10'000 Ws	Limit
En.min.=	Minimum energy	0 - 10'000 Ws	Limit
Energy=	Current energy value		Measured value
Time=	Current time		Measured value
Parts=	Part counter		Measured value
Required=	Required part count		Limits
Rejects=	Rejected part counter		Measured value
Delaytime=	Impulse delay time	0.000 - 1.999 s	Parameter
US-Pulse=	Delayed impulse	0.000 - 1.999 s	Parameter
Power Peak=	Maximum power		Measured value
Power Loss=	Power loss		Measured value
Horn=	Horn number		Info
Fixture=	Fixture number		Info
Booster= 1:	Size of the booster		Info
Pressure=	System pressure		Info
Speed=	Flow control valve performance		Info

1)

Parameter

- Directly influences the welding result. The parameters can be changed.

Limits

- If a limit is exceeded, an error message is output. The values can be changed.

Measured Value

- Measured values. The values can be read but not changed.

Info

- These values are only for information. The values can be changed.

* The amplitude cannot be adjusted for the PCS I. The amplitude is always at 100%.

Weld Time

- This parameter sets the welding time.

Trigger

- This parameter adjusts the triggering of the ultrasonic generator. The higher the value, the higher the pressure on the object to be welded.

Hold Time

- After the welding time has run out, the holding time starts. The object welded can harden under pressure during the hold time.

Amplitude

- The output amplitude can be set to one of five levels from 100% down to 60%.
- The values are changed using the ***CLR*** button.
- The amplitude cannot be changed for the PCS I. The amplitude is always at 100%.

Maximum Energy

- If the amount of energy output is higher than the specified value, the error message "Energy too high" is displayed.

Minimum Energy

- If the amount of energy output is smaller than the specified value, the error message "Energy too low" is displayed.

Energy

- Effective measured energy.

Time

- Effective measured time.

Part Counter

- Counts the number of fault-free welded parts.
- The Part Counter can be reset using the ***CLR*** key.

Required Part Count

- After reaching the specified part count, the message "Part count reached !!" is displayed.
- Is only active if F 4729 has been initialized to ON.

Reject Counter

- Counts the number of incorrectly welded parts.
- The Reject Counter can be reset using the ***CLR*** key. The Reject Counter is automatically reset when the Part Counter is reset.

Delay Time

- The impulse delay time starts after the hold time has run out.

US-Pulse

- After the impulse delay time has run out, the ultrasonic pulse is activated. Using the us-pulse, an object sticking to the sonotrode can be shaken off.

Power Peak

- The setting for the maximum power is displayed.

Power Loss

- The power loss of the vibration system is displayed.

Horn Number

- The part number of the sonotrode can be noted for information purposes.

Fixture Number

- The part number of the fixture can be noted for information purposes.

Booster 1:

- The size of the booster can be noted for information purposes.

Pressure

- The pressure of the press system can be noted for information purposes.

Speed

- The flow control setting of the press can be noted for information purposes.

7.4 The ENERGY Operating Mode

The amount of energy output is held constant in the energy mode.

A miminum and a maximum welding time can be set as limits.

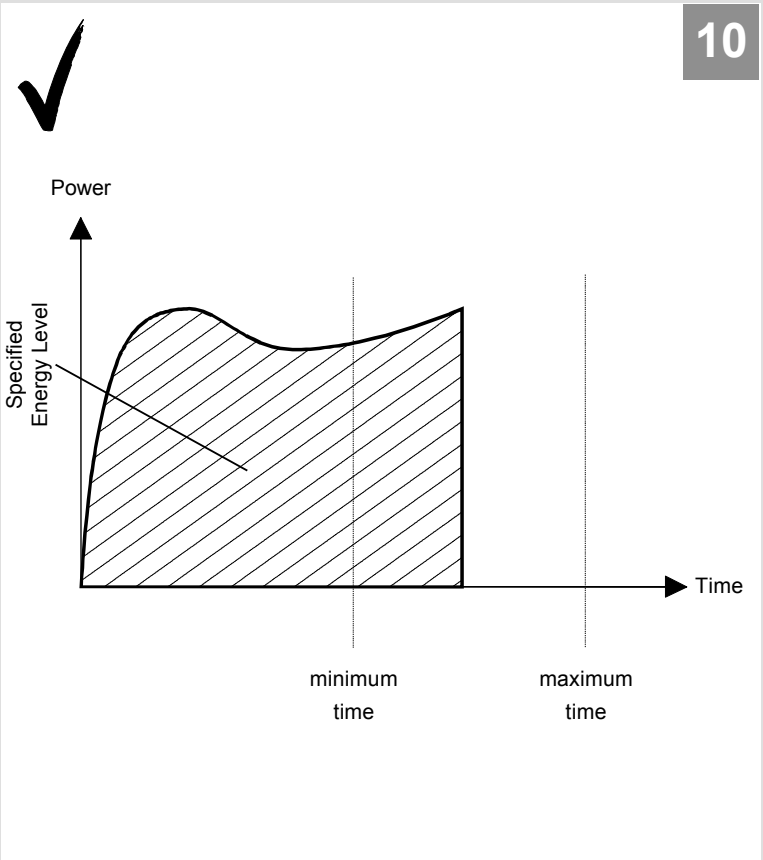
The length of the welding time can vary within the limits of a certain range. The range is affected by the tolerances of the parts to be welded. By holding the energy constant, certain variations can be eliminated.

7.4.1 The Time Window in the ENERGY Mode

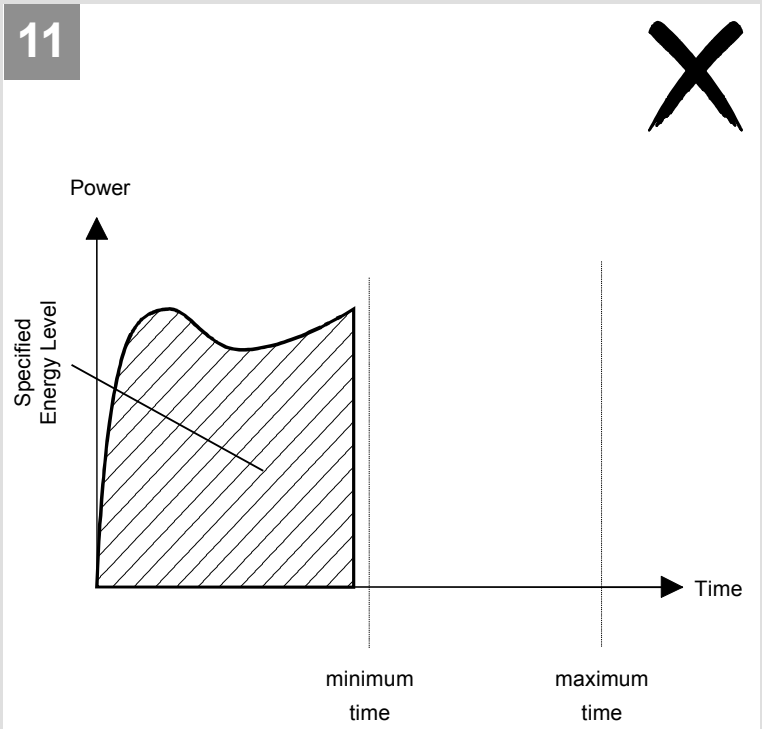
Correct welding

The welding energy must remain within the set limits. If these limits are exceeded, an error message is displayed.

10



11



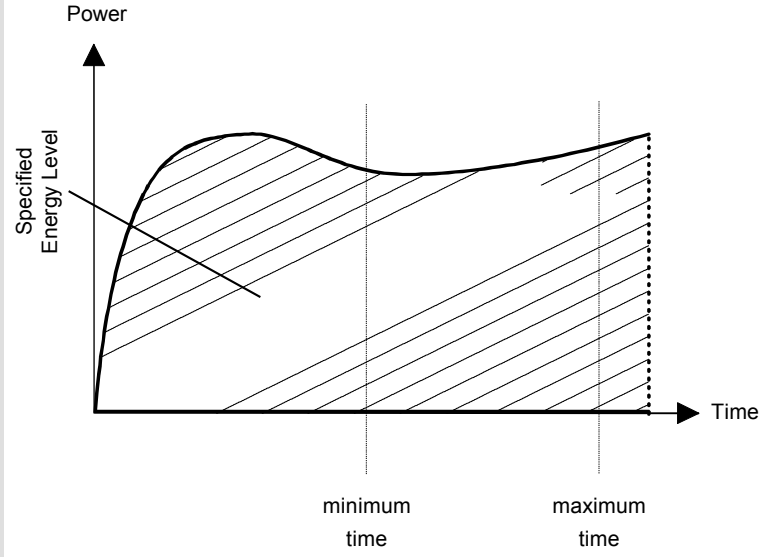
Time underflow

If the minimum time limit is not reached, then the error message "Time underflow" is displayed.

Possible causes are:

- minimum welding time too long
- system pressure too high
- amplitude too high
- object to be welded is defective

12



Time overflow

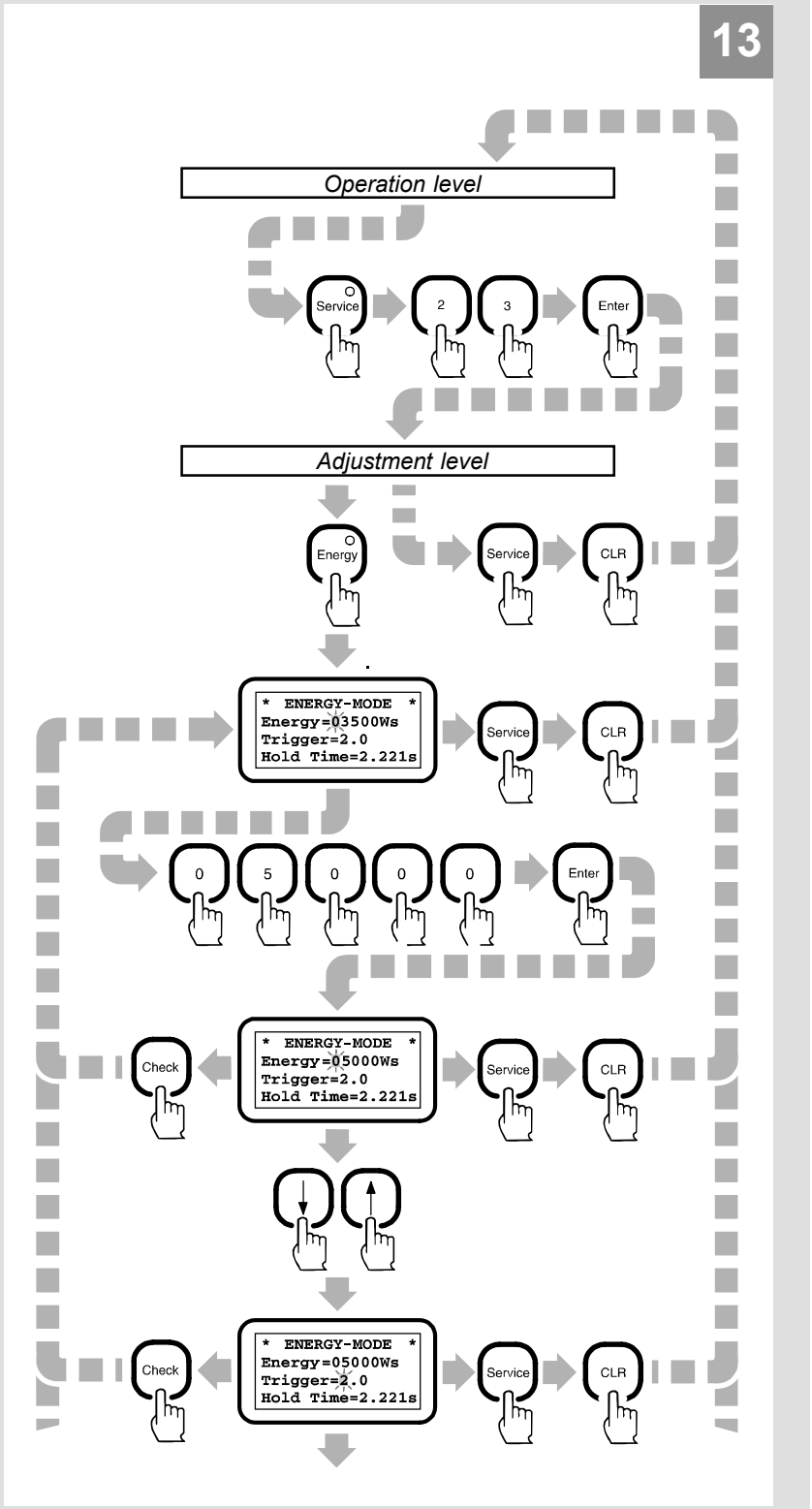
If the maximum time limit is exceeded, then the error message "Time overflow" is displayed.

Possible causes are:

- maximum welding time too short
- system pressure too low
- amplitude too low
- no object in the fixture
- object to be welded is defective

7.4.2 Overview of the ENERGY Mode Functions

End each entry of new data by pressing the "Enter" key.



7.4.3 Parameters of the ENERGY Operating Mode

Parameter Display	Designation	Adjustment Range	Function[1)]
Energy=	Energy	0 - 10'000 Ws	Parameter
Trigger=	Ultrasonic trigger	0.0 - 9.9	Parameter
Hold Time=	Hold time	0.000 - 9.999 s	Parameter
Amplitude=	Amplitude*	60 / 70 / 80 / 90 / 100	Parameter
Time max.=	Maximum weld time	0.000 - 9.999 s	Limit
Time min.=	Minimum weld time	0.000 - 9.999 s	Limit
Energy=	Current energy value		Measured value
Time=	Current time		Measured value
Parts=	Part counter		Measured value
Required=	Required part count		Limit
Rejects=	Rejected part counter		Measured value
Delaytime=	Impulse delay time	0.000 - 1.999 s	Parameter
US-Pulse=	Delayed impulse	0.000 - 1.999 s	Parameter
Power Peak=	Maximum power		Measured value
Power Loss=	Power loss		Measured value
Horn=	Horn number		Info
Fixture=	Fixture number		Info
Booster= 1:	Size of the booster		Info
Pressure=	System pressure		Info
Speed=	Flow control valve performance		Info

1)

Parameter

- Directly influences the welding result. The parameters can be changed.

Limits

- If a limit is exceeded, an error message is output. The values can be changed.

Measured Value

- Measured values. The values can be read but not changed.

Info

- These values are only for information. The values can be changed.

* The amplitude cannot be adjusted for the PCS I. The amplitude is always at 100%.

Energy

- This parameter sets the energy level.

Trigger

- This parameter adjusts the triggering of the ultrasonic generator. The higher the value, the higher the pressure on the object to be welded.

Hold Time

- After the welding time has run out, the holding time starts. The object welded can harden under pressure during the hold time.

Amplitude

- The output amplitude can be set to one of five levels from 100% down to 60%.
- The values are changed using the ***CLR*** button.
- The amplitude cannot be changed for the PCS I. The amplitude is always at 100%.

Maximum Weld Time

- If the weld time is longer than the specified value, the error message "Time overflow" is displayed.

Minimum Weld Time

- If the weld time is shorter than the specified value, the error message "Time underflow" is displayed.

Energy

- Effective measured energy.

Time

- Effective measured time.

Part Counter

- Counts the number of fault-free welded parts.
- The Part Counter can be reset using the ***CLR*** key.

Required Part Count

- After reaching the specified part count, the message "Part count reached !!" is displayed.
- Is only active if F 4729 has been initialized to ON.

Reject Counter

- Counts the number of incorrectly welded parts.
- The Reject Counter can be reset using the ***CLR*** key. The Reject Counter is automatically reset when the Part Counter is reset.

Delay Time

- The impulse delay time starts after the hold time has run out.

US-Pulse

- After the impulse delay time has run out, the ultrasonic pulse is activated. Using the us-pulse, an object sticking to the sonotrode can be shaken off.

Power Peak

- The setting for the maximum power is displayed.

Power Loss

- The power loss of the vibration system is displayed.

Horn Number

- The part number of the sonotrode can be noted for information purposes.

Fixture Number

- The part number of the fixture can be noted for information purposes.

Booster 1:

- The size of the booster can be noted for information purposes.

Pressure

- The pressure of the press system can be noted for informational purposes.

Speed

- The flow control performance of the press can be noted for information purposes.

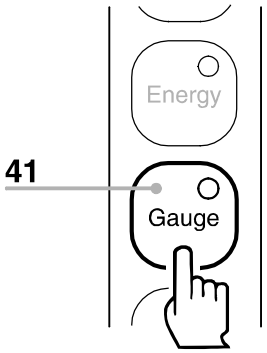
7.5 The TRAVEL Operating Mode

There are three different TRAVEL operating modes available.

1. Differential TRAVEL MODE
2. Absolute 1 TRAVEL MODE
3. Absolute 2 TRAVEL MODE

The TRAVEL MODE is activated by pressing the ***GAUGE*** button.

14



7.5.1 Differential TRAVEL MODE

With this operating mode, the exact same amount of material is to be melted for each weld. The weld depth (DEPTH) has the highest priority.

The advantage of the differential method is that differences in the size and density of the objects to be welded are continually compensated for.

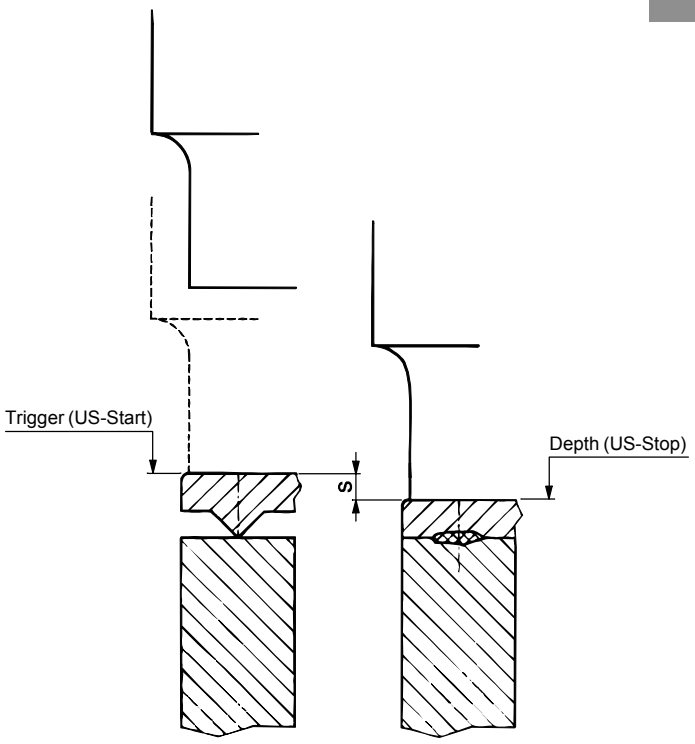
Cycle

After reaching the TRIGGER (Sensor), the welding process is activated. After activation, the objects are welded until the DEPTH [S] is reached.

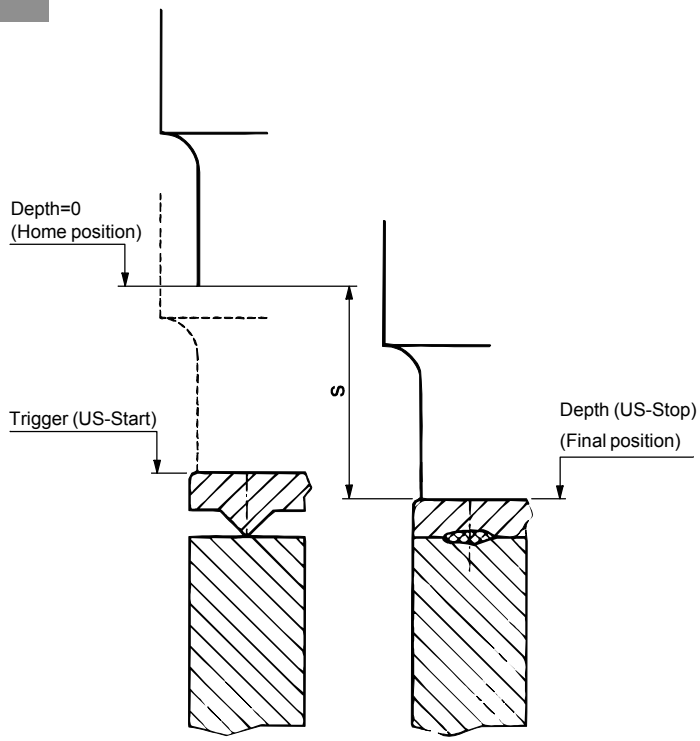
The current travel value is measured at the end of the holding time.

An energy range and a maximum weld time can be set as limits.

15



16



7.5.2 Absolute 1 TRAVEL MODE

With this operating mode, the same final size is to be achieved after each weld. The final size of the welded part has the highest priority.

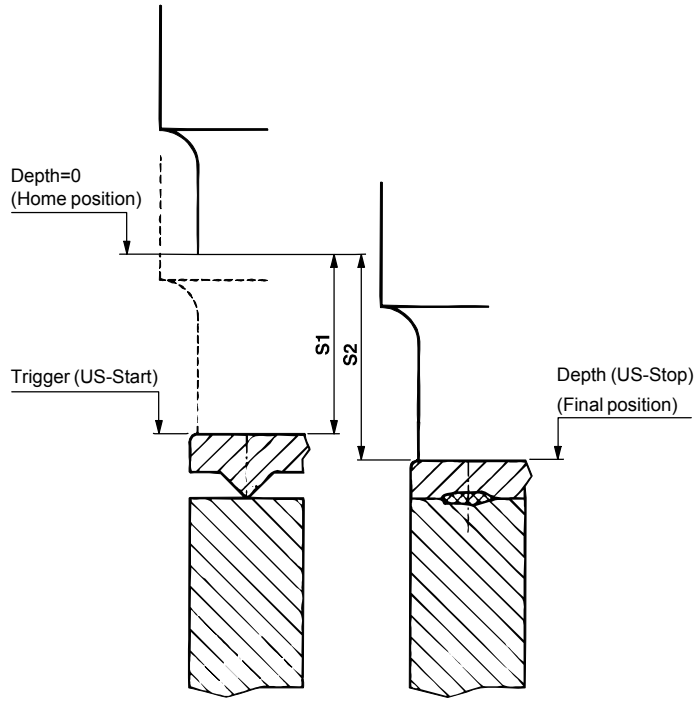
Cycle

After reaching the TRIGGER (Sensor), the welding process is activated. After activation, the objects are welded until the DEPTH [S] is reached. The value of the DEPTH [S] is calculated starting from the upper home position.

The current travel value is measured at the end of the holding time.

An energy range and a maximum weld time can be set as limits.

17



7.5.3 Absolute 2 TRAVEL MODE

With this operating mode, the same final size is to be achieved after each weld. The final size of the welded part has the highest priority.

Cycle

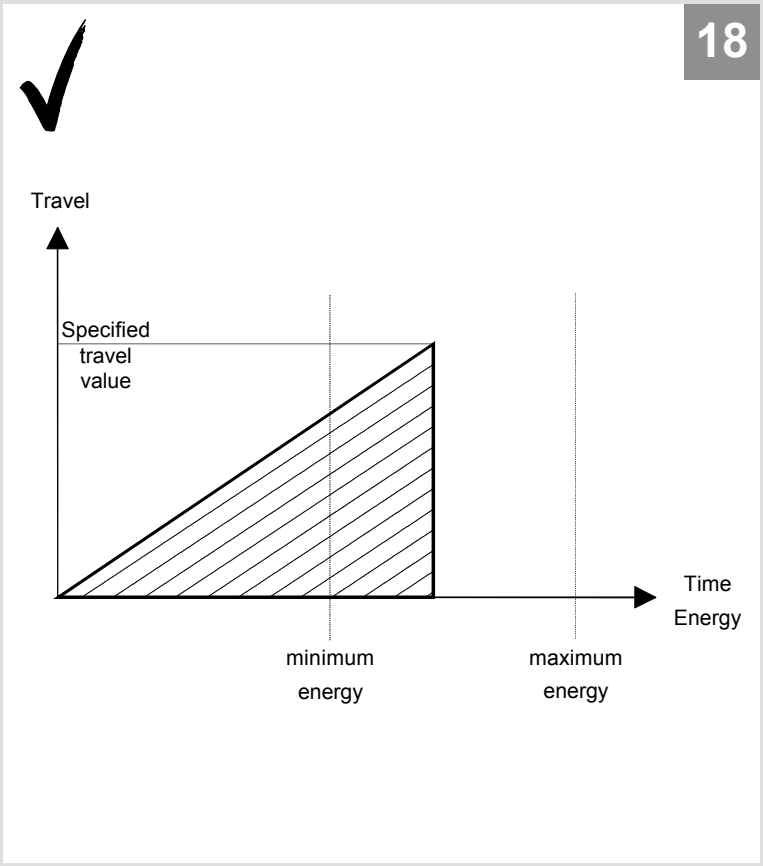
After reaching the TRIGGER [S1] (Travel), the welding process is activated. After activation, the objects are welded until the DEPTH [S2] is reached. The value of the DEPTH [S2] is calculated starting from the upper home position.

The current travel value is measured at the end of the holding time.

An energy range and a maximum weld time can be set as limits.

Correct welding

The weld depth must be reached before the end of the maximum weld time and must use an amount of energy which is within the energy range, otherwise an error message is displayed.

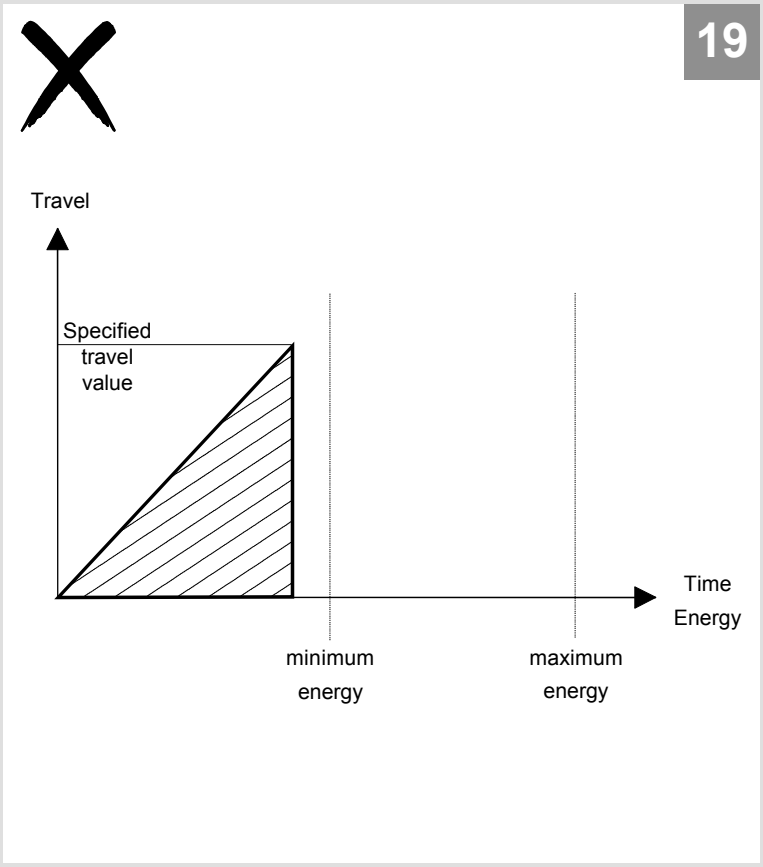


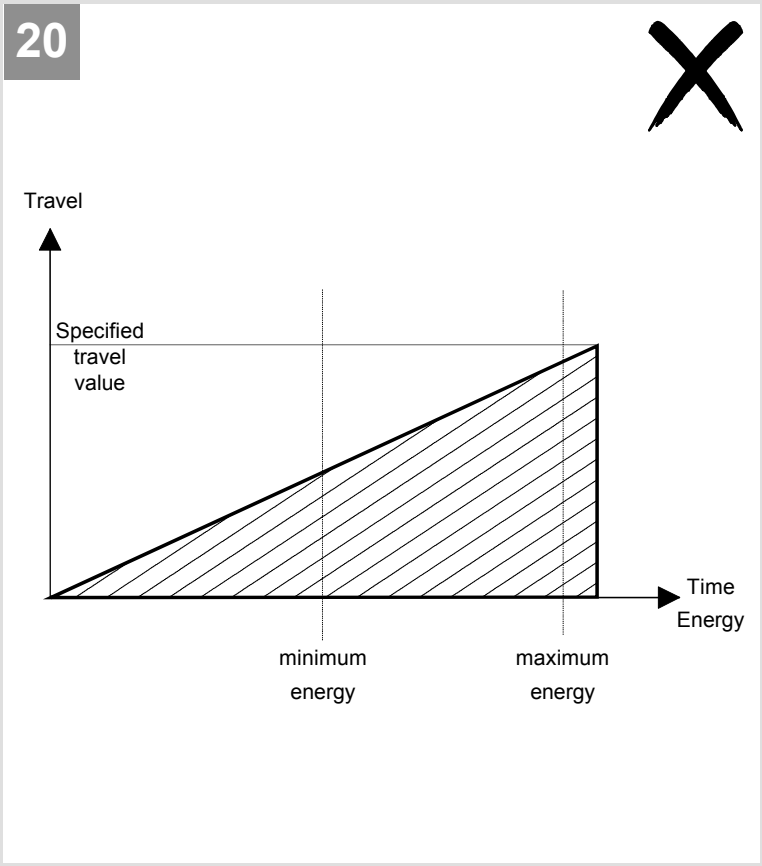
Energy too low

If the energy limit is not reached, the error message "Energy too low" is displayed.

Possible causes are:

- System pressure too low
- Amplitude too small
- Object to be welded not in the fixture
- Object to be welded defective





Energy too high

If the energy used rises beyond the upper energy limit, the error message "Energy too high" is displayed.

Possible causes are:

- Travel value cannot be reached.
- System pressure too high
- Amplitude too high
- Object to be welded defective

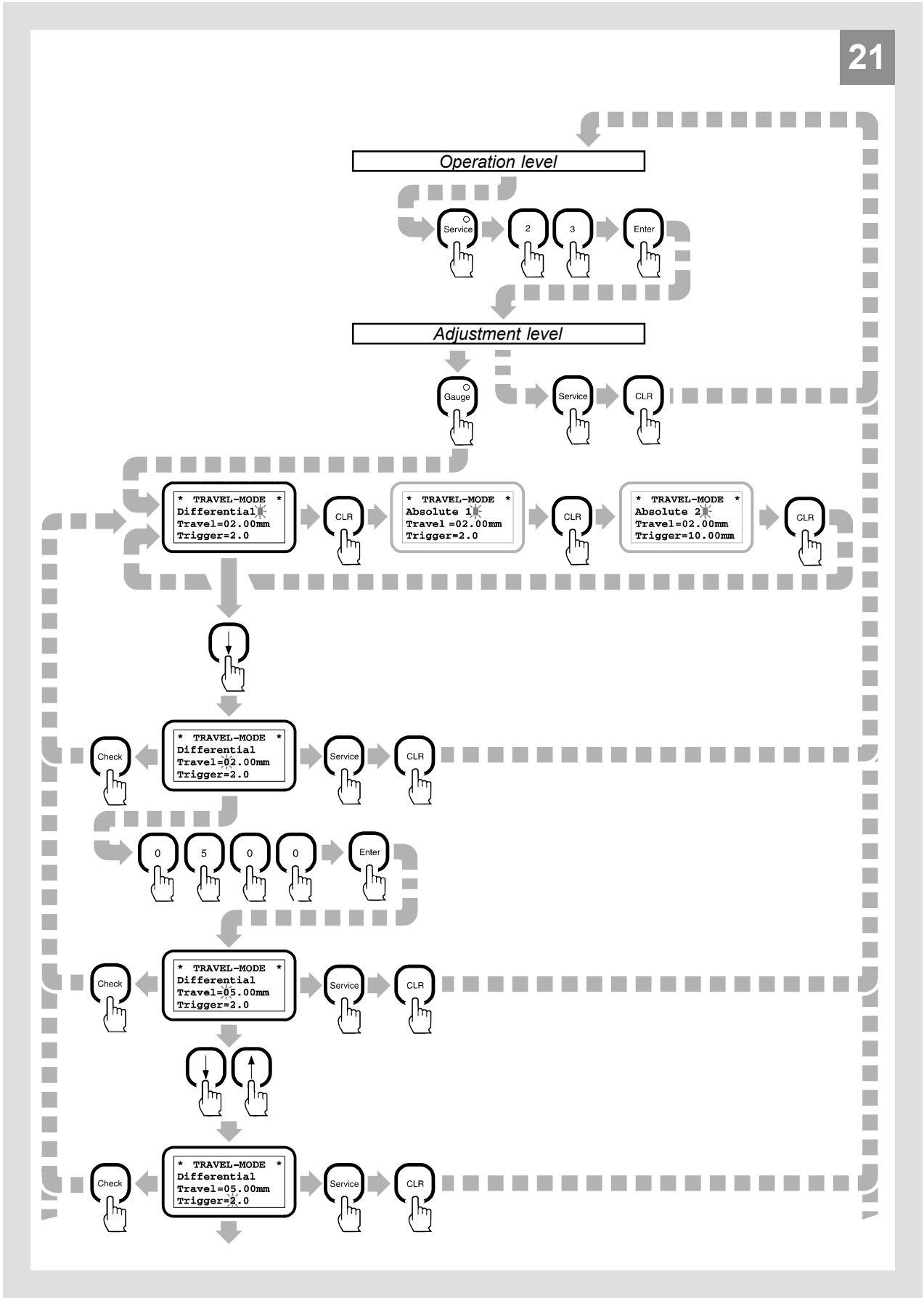
Time overflow

If the time limit is exceeded, the error message "Time overflow" is displayed.

Possible causes are:

- Travel value cannot be reached
- maximum weld time too short
- System pressure too low
- Amplitude too low
- No object to be welded in fixture
- Object to be welded defective

7.5.4 Overview of Functions for the Differential TRAVEL MODE



7.5.5 Parameters of the Differential TRAVEL Operating Mode

Parameter Display	Designation	Adjustment Range	Function[1)]
Differential			
Travel=	Weld depth	00.00 - 99.99 mm	Parameter
Trigger=	Ultrasonic trigger	0.0 - 9.9	Parameter
Hold Time=	Hold time	0.000 - 9.999 s	Parameter
Amplitude=	Amplitude*	60 / 70 / 80 / 90 / 100	Parameter
En.max.=	Maximum energy	0 - 10'000 Ws	Limit
En.min.=	Minimum energy	0 - 10'000 Ws	Limit
Energy=	Current energy value		Measured value
Travel=	Current travel value		Measured value
Time=	Current time		Measured value
Parts=	Part counter		Measured value
Required=	Required part count		Limits
Rejects=	Rejected part counter		Measured value
Delaytime=	Impulse delay time	0.000 - 1.999 s	Parameter
US-Pulse=	Delayed impulse	0.000 - 1.999 s	Parameter
Power Peak=	Maximum power		Measured value
Power Loss=	Power loss		Measured value
Horn=	Horn number		Info
Fixture=	Fixture number		Info
Booster= 1:	Size of the booster		Info
Pressure=	System pressure		Info
Speed=	Flow control valve performance		Info

1)

Parameter

- Directly influences the welding result. The parameters can be changed.

Limits

- If a limit is exceeded, an error message is output. The values can be changed.

Measured Value

- Measured values. The values can be read but not changed.

Info

- These values are only for information. The values can be changed.

* The amplitude cannot be adjusted for the PCS I. The amplitude is always at 100%.

Travel

- This parameter specifies the depth of the weld. The weld depth is calculated starting after the triggering.

Trigger

- This parameter adjusts the triggering of the ultrasonic horn. The higher the value, the higher the pressure on the object to be welded.

Hold Time

- After the welding time has run out, the holding time starts. The object welded can harden under pressure during the hold time.

Amplitude

- The output amplitude can be set to one of five levels from 100% down to 60%.
- The values are changed using the ***CLR*** button.
- The amplitude cannot be changed for the PCS I. The amplitude is always at 100%.

Maximum Energy

- If the amount of energy output is higher than the specified value, the error message "Energy too high" is displayed.

Minimum Energy

- If the amount of energy output is smaller than the specified value, the error message "Energy too low" is displayed.

Energy

- Effective measured energy.

Travel

- Effective measured depth.

Time

- Effective measured time.

Part Counter

- Counts the number of fault-free welded parts.
- The Part Counter can be reset using the ***CLR*** key.

Required Part Count

- After reaching the specified part count, the message "Part count reached !!" is displayed.
- Is only active if F 4729 has been initialized to ON.

Reject Counter

- Counts the number of incorrectly welded parts.
- The Reject Counter can be reset using the ***CLR*** key. The Reject Counter is automatically reset when the Part Counter is reset.

Delay Time

- The impulse delay time starts after the hold time has run out.

US-Pulse

- After the impulse delay time has run out, the ultrasonic pulse is activated. Using the us-pulse, an object sticking to the sonotrode can be shaken off.

Power Peak

- The setting for the maximum power is displayed.

Power Loss

- The power loss of the vibration system is displayed.

Horn Number

- The part number of the sonotrode can be noted for information purposes.

Fixture Number

- The part number of the fixture can be noted for information purposes.

Booster 1:

- The size of the booster can be noted for information purposes.

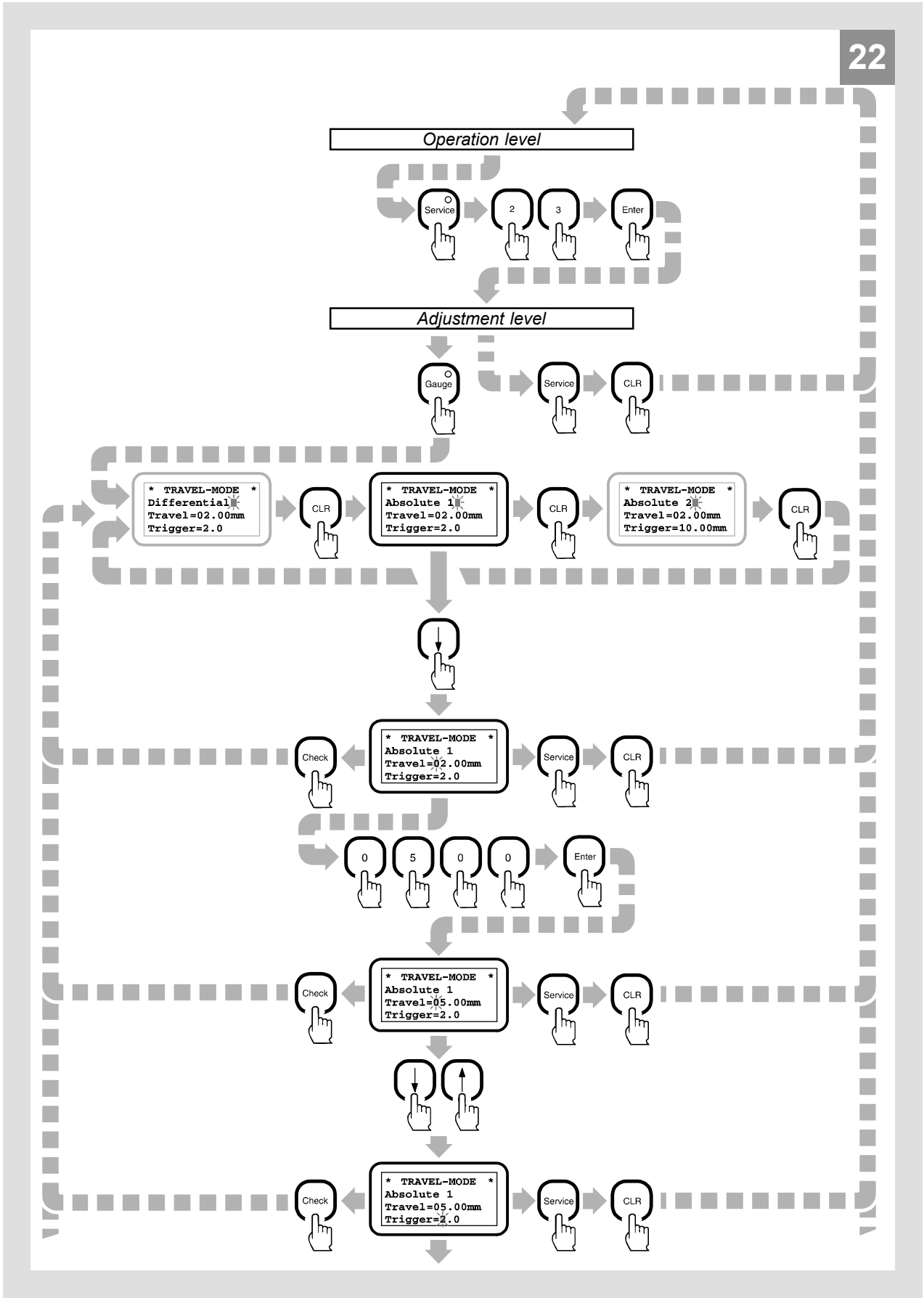
Pressure

- The pressure of the press system can be noted for information purposes.

Speed

- The flow control performance of the press can be noted for information purposes.

7.5.6 Overview of Functions for the Absolute 1 TRAVEL MODE



7.5.7 Parameters of the Absolute 1 TRAVEL Operating Mode

Parameter Display	Designation	Adjustment Range	Function[1)]
Absolute 1			
Travel=	Weld depth	00.00 - 99.99 mm	Parameter
Trigger=	Ultrasonic trigger	0.0 - 9.9	Parameter
Hold Time=	Hold time	0.000 - 9.999 s	Parameter
Amplitude=	Amplitude*	60 / 70 / 80 / 90 / 100	Parameter
En.max.=	Maximum energy	0 - 10'000 Ws	Limit
En.min.=	Minimum energy	0 - 10'000 Ws	Limit
Max. time =	Maximum time		Parameter
Energy=	Current energy value		Measured value
Travel=	Current travel value		Measured value
Time=	Current time		Measured value
Parts=	Part counter		Measured value
Required=	Required part count		Limits
Rejects=	Rejected part counter		Measured value
Delaytime=	Impulse delay time	0.000 - 1.999 s	Parameter
US-Pulse=	Delayed impulse	0.000 - 1.999 s	Parameter
Power Peak=	Maximum power		Measured value
Power Loss=	Power loss		Measured value
Horn=	Horn number		Info
Fixture=	Fixture number		Info
Booster= 1:	Size of the booster		Info
Pressure=	System pressure		Info
Speed=	Flow control valve performance		Info

1)

Parameter

- Directly influences the welding result. The parameters can be changed.

Limits

- If a limit is exceeded, an error message is output. The values can be changed.

Measured Value

- Measured values. The values can be read but not changed.

* The amplitude cannot be adjusted for the PCS I. The amplitude is always at 100%.

Info

- These values are only for information. The values can be changed.

Travel

- This parameter specifies the depth of the weld. The weld depth is calculated starting after the triggering.

Trigger

- This parameter adjusts the triggering of the ultrasonic horn. The higher the value, the higher the pressure on the object to be welded.

Hold Time

- After the welding time has run out, the holding time starts. The object welded can harden under pressure during the hold time.

Amplitude

- The output amplitude can be set to one of five levels from 100% down to 60%.
- The values are changed using the ***CLR*** button.
- The amplitude cannot be changed for the PCS I. The amplitude is always at 100%.

Maximum Energy

- If the amount of energy output is higher than the specified value, the error message "Energy too high" is displayed.

Minimum Energy

- If the amount of energy output is smaller than the specified value, the error message "Energy too low" is displayed.

Maximum time

- Error message "Time exceeded" will be issued if the maximum time limit is exceeded.

Energy

- Effective measured energy.

Travel

- Effective measured depth.

Time

- Effective measured time.

Part Counter

- Counts the number of fault-free welded parts.
- The Part Counter can be reset using the ***CLR*** key.

Required Part Count

- After reaching the specified part count, the message "Part count reached !!" is displayed.
- Is only active if F 4729 has been initialized to ON.

Reject Counter

- Counts the number of incorrectly welded parts.
- The Reject Counter can be reset using the ***CLR*** key. The Reject Counter is automatically reset when the Part Counter is reset.

Delay Time

- The impulse delay time starts after the hold time has run out.

US-Pulse

- After the impulse delay time has run out, the ultrasonic pulse is activated. Using the us-pulse, an object sticking to the sonotrode can be shaken off.

Power Peak

- The setting for the maximum power is displayed.

Power Loss

- The power loss of the vibration system is displayed.

Horn Number

- The part number of the sonotrode can be noted for information purposes.

Fixture Number

- The part number of the fixture can be noted for information purposes.

Booster 1:

- The size of the booster can be noted for information purposes.

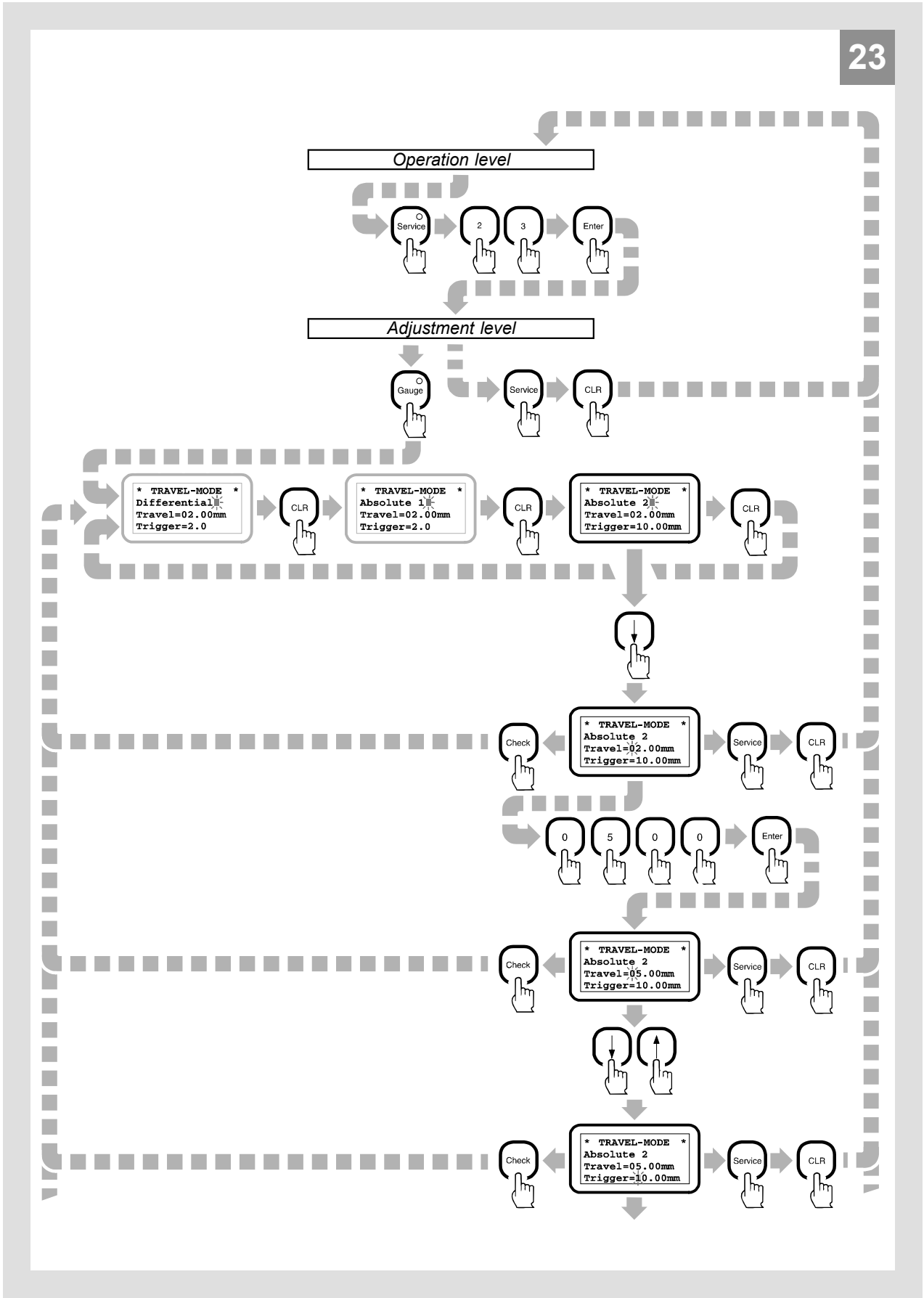
Pressure

- The pressure of the press system can be noted for information purposes.

Speed

- The flow control performance of the press can be noted for information purposes.

7.5.8 Overview of Functions for the Absolute 2 TRAVEL MODE



7.5.9 Parameters of the Absolute 2 TRAVEL Operating Mode

Parameter Display	Designation	Adjustment Range	Function[1)]
Absolute 2			
Travel=	Weld depth	00.00 - 99.99 mm	Parameter
Trigger=	Ultrasonic trigger	00.00 - 99.99 mm	Parameter
Hold Time=	Hold time	0.000 - 9.999 s	Parameter
Amplitude=	Amplitude*	60 / 70 / 80 / 90 / 100	Parameter
En.max.=	Maximum energy	0 - 10'000 Ws	Limit
En.min.=	Minimum energy	0 - 10'000 Ws	Limit
Energy=	Current energy value		Measured value
Travel=	Current travel value		Measured value
Time=	Current time		Measured value
Parts=	Part counter		Measured value
Required=	Required part count		Limits
Rejects=	Rejected part counter		Measured value
Delaytime=	Impulse delay time	0.000 - 1.999 s	Parameter
US-Pulse=	Delayed impulse	0.000 - 1.999 s	Parameter
Power Peak=	Maximum power		Measured value
Power Loss=	Power loss		Measured value
Horn=	Horn number		Info
Fixture=	Fixture number		Info
Booster= 1:	Size of the booster		Info
Pressure=	System pressure		Info
Speed=	Flow control valve performance		Info

1)

Parameter

- Directly influences the welding result. The parameters can be changed.

Limits

- If a limit is exceeded, an error message is output. The values can be changed.

Measured Value

- Measured values. The values can be read but not changed.

Info

- These values are only for information. The values can be changed.

* The amplitude cannot be adjusted for the PCS I. The amplitude is always at 100%.

Travel

- This parameter specifies the depth of the weld. The weld depth is calculated starting after the triggering.

Trigger

- This parameter adjusts the triggering of the ultrasonic horn. The higher the value, the higher the pressure on the object to be welded.

Hold Time

- After the welding time has run out, the holding time starts. The object welded can harden under pressure during the hold time.

Amplitude

- The output amplitude can be set to one of five levels from 100% down to 60%.
- The values are changed using the ***CLR*** button.
- The amplitude cannot be changed for the PCS I. The amplitude is always at 100%.

Maximum Energy

- If the amount of energy output is higher than the specified value, the error message "Energy too high" is displayed.

Minimum Energy

- If the amount of energy output is smaller than the specified value, the error message "Energy too low" is displayed.

Energy

- Effective measured energy.

Travel

- Effective measured depth.

Time

- Effective measured time.

Part Counter

- Counts the number of fault-free welded parts.
- The Part Counter can be reset using the ***CLR*** key.

Required Part Count

- After reaching the specified part count, the message "Part count reached !!" is displayed.
- Is only active if F 4729 has been initialized to ON.

Reject Counter

- Counts the number of incorrectly welded parts.
- The Reject Counter can be reset using the ***CLR*** key. The Reject Counter is automatically reset when the Part Counter is reset.

Delay Time

- The impulse delay time starts after the hold time has run out.

US-Pulse

- After the impulse delay time has run out, the ultrasonic pulse is activated. Using the us-pulse, an object sticking to the sonotrode can be shaken off.

Power Peak

- The setting for the maximum power is displayed.

Power Loss

- The power loss of the vibration system is displayed.

Horn Number

- The part number of the sonotrode can be noted for information purposes.

Fixture Number

- The part number of the fixture can be noted for information purposes.

Booster 1:

- The size of the booster can be noted for information purposes.

Pressure

- The pressure of the press system can be noted for information purposes.

Speed

- The flow control performance of the press can be noted for information purposes.

7.6 The PRINT Function *

7.6.1 Possible Selections in the Print Menu

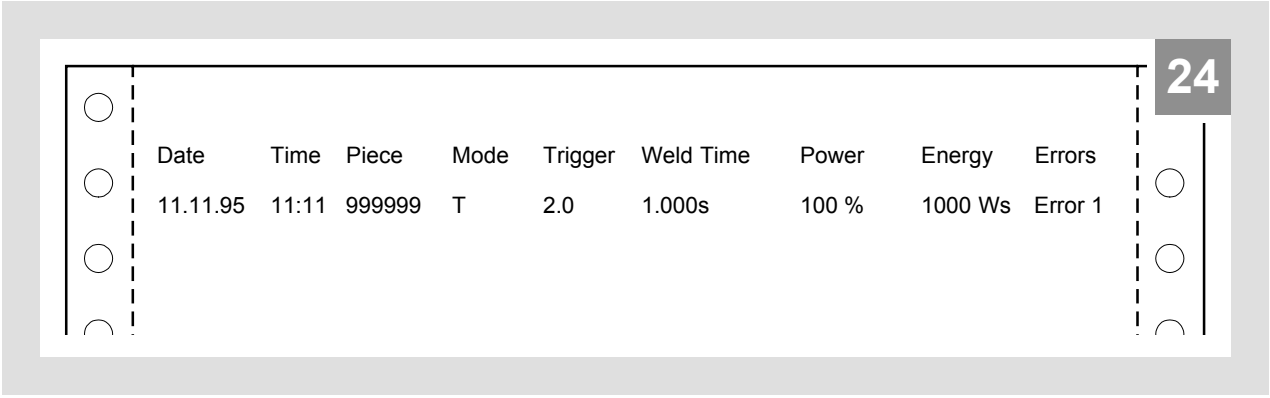
Welding data and welding diagrams can be sent out over the serial interface to a printer for printout with the PCS.

The welding data can also be transferred to an SPC software program.

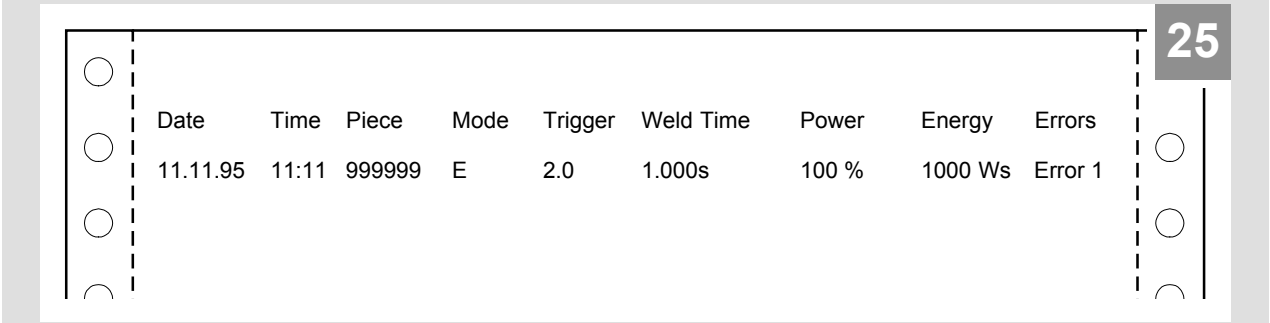
*only for the PCS II

7.6.2 Printing the Welding Data

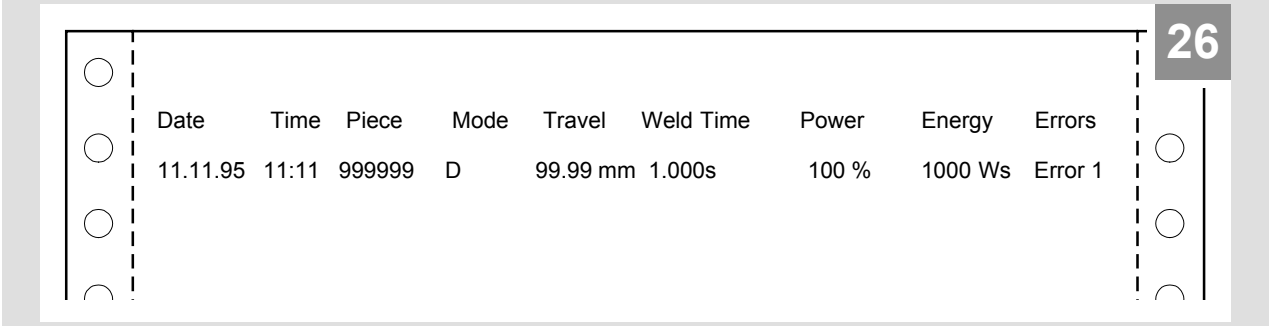
1. Time Mode



2. Energy Mode



3. Differential Travel Mode



4. Absolute 1 Travel Mode

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Date	Time	Piece	Mode	Travel	Weld Time	Power	Energy	Errors
11.11.95	11:11	999999	A 1	99.99 mm	1.000s	100 %	1000 Ws	Error 1

5. Absolute 2 Travel Mode

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Date	Time	Piece	Mode	Travel	Weld Time	Power	Energy	Errors
11.11.95	11:11	999999	A 2	99.99 mm	1.000s	100 %	1000 Ws	Error 1

7.6.3 Printout of the Welding Diagram

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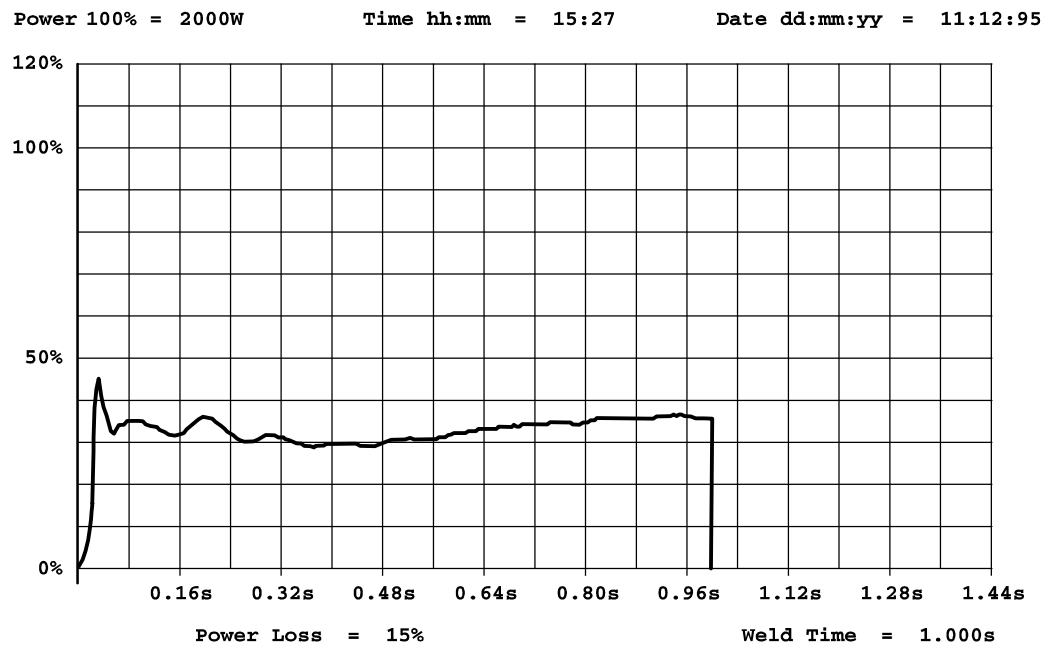
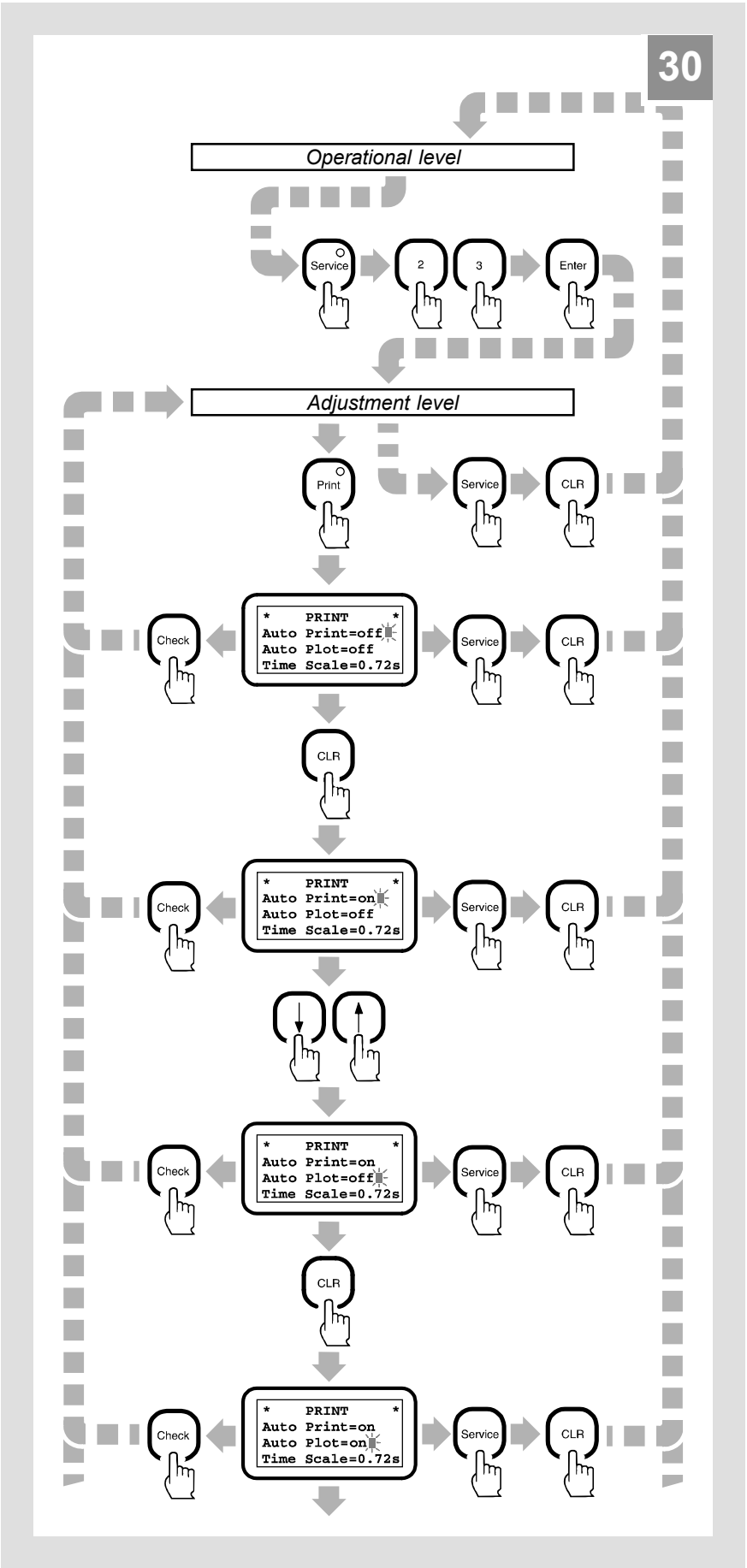


7.6.4 Overview of Functions



7.6.5 Parameter Settings of the PRINT / PLOT Functions

Parameter Display	Designation	Adjustments
`Auto Print=`	Print welding data	on / off
`Auto Plot=`	Print welding diagram	on / off
`Time Scale=`	Time axis	0.36, 0.72, 1.44, 2.88, 5.76, 9.72 s
`Baud Rate=`	Baud Rate	300, 1200, 9600
`Print Gap=`	Print interval	0 - 9999
`Output=`	Output	Printer, SPC

Print welding data

Using the ***CLR*** key, the printing of the welding data can be switched on or off. The printout depends on the setting of the print gap parameter. The data for faulty welds are always printed out. If the print gap is set to 0000, only the data for faulty welds is printed out.

The data for the last weld can be printed out after the weld has been completed by pressing the ***Enter*** key.

Print welding diagram

Using the ***CLR*** key, the printing of the welding diagram can be switched on or off. The printout depends on the setting of the print gap parameter. The diagrams for faulty welds is always printed out. If the print gap is set to 0000, only the diagrams for faulty welds are printed out.

The diagram for the last weld can be printed out after the weld has been completed by pressing the ***Enter*** key.

Time Scale

The appropriate time scale for the time axis must be selected according to the weld time. The value for the scaling can be changed by pressing the ***CLR*** key.

Baud Rate

The baud rate of the RS 232 interface can be selected. Different values for the baud rate can be selected by pressing the ***CLR*** key.

Output format: 8bit / no parity / 1 stop bit

Print Interval

If a printout is not to be sent to the printer after each weld, a print interval can be set. The data for faulty welds are always printed out. If the print gap is set to 0000, only the data for faulty welds is printed out.

Output

The output can be sent to a serial printer or transferred to an SPC program. The value can be changed by pressing the ***CLR*** key.

7.7 The DATA BANK Function*

7.7.1 Possibilities of the DATA BANK Function

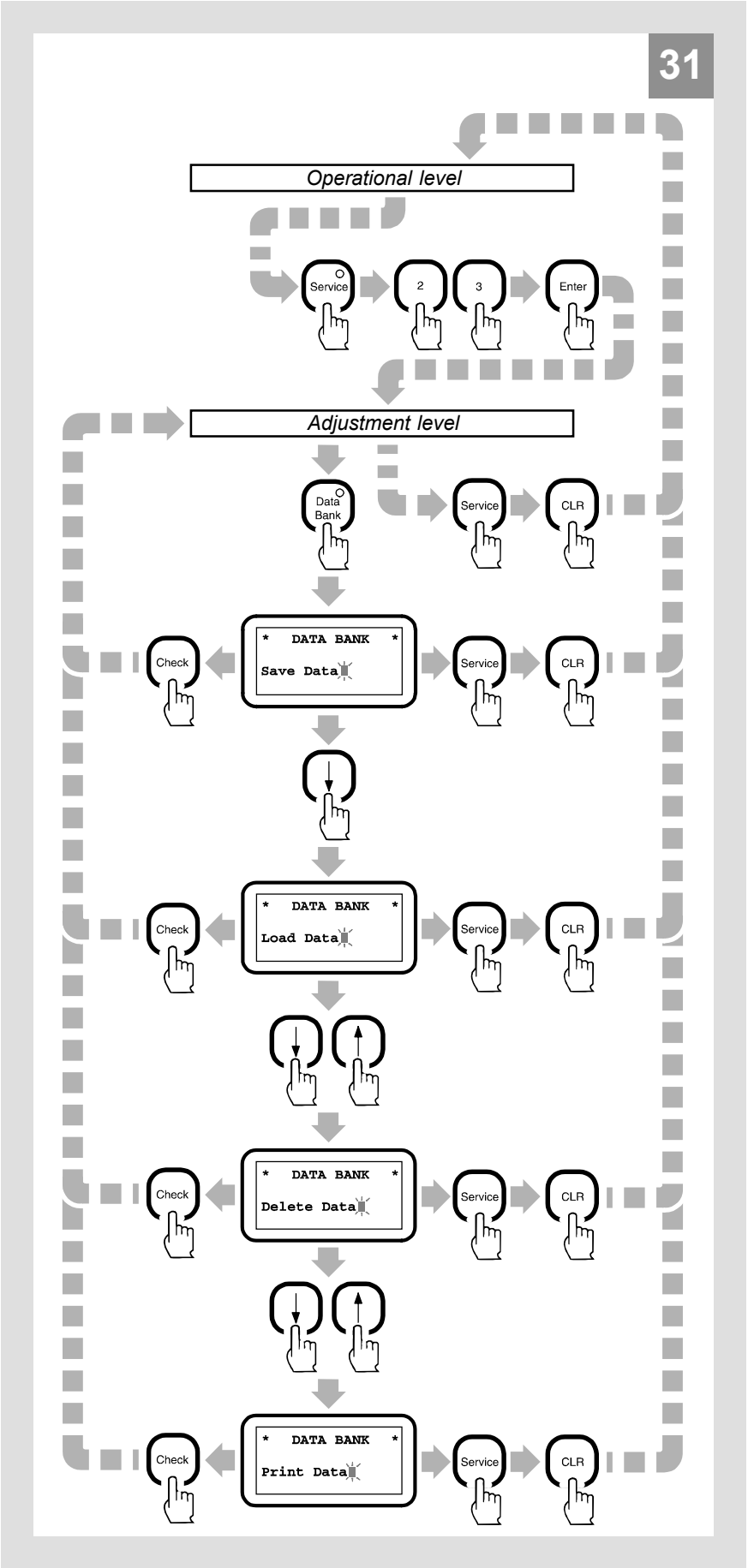
In actual applications, the same ultrasonic equipment is often used for welding several different types of materials in alternating operating modes.

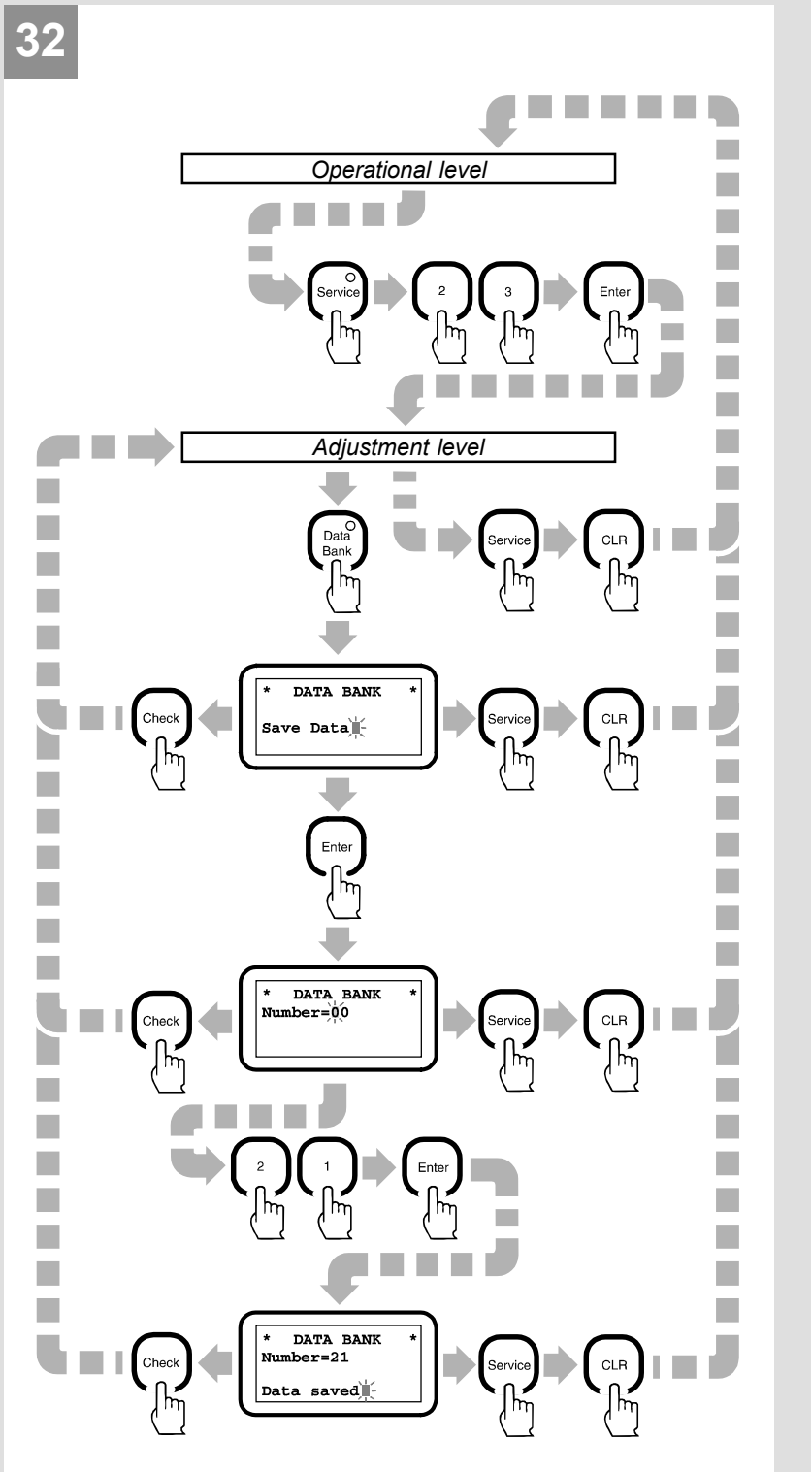
The DATA BANK function offers a useful extension of the PCS system in this case.

All of the most important settings and specified values can be stored. There are 40 storage locations available for storing data.

The individual databanks can also be optionally selected over the RS 232 interface.

* only for the PCS II





7.7.2 Saving Data

To save the data entered, go into the adjustment level.

1. Press the ***Service*** key.
2. Enter the code ***"23"*** .
3. Confirm the entry by pressing the ***Enter*** key.

After you have changed to the adjustment level

4. press the ***Data Bank*** key.

The display shows the first databank function, "Save Data".

5. Press the ***Enter*** key.

The number of the next location available for storing data now appears in the display.

You can select this number or enter a different number.

6. Confirm the entry by pressing the ***Enter*** key.

If the desired storage location is invalid or is already in use, a message will appear in the display.

If the data has been saved correctly, the message "Data saved" appears in the display. By pressing the ***Check*** key, you return to the initial position.

7.7.3 Loading Data

After you have switched to the adjustment level,

1. press the ***Data Bank*** key.

The display now shows the first databank function "Save Data".

2. Using the cursor keys, select the "Load Data" function ..
3. Press the ***Enter*** key.

The number of the last occupied storage location then appears in the display.

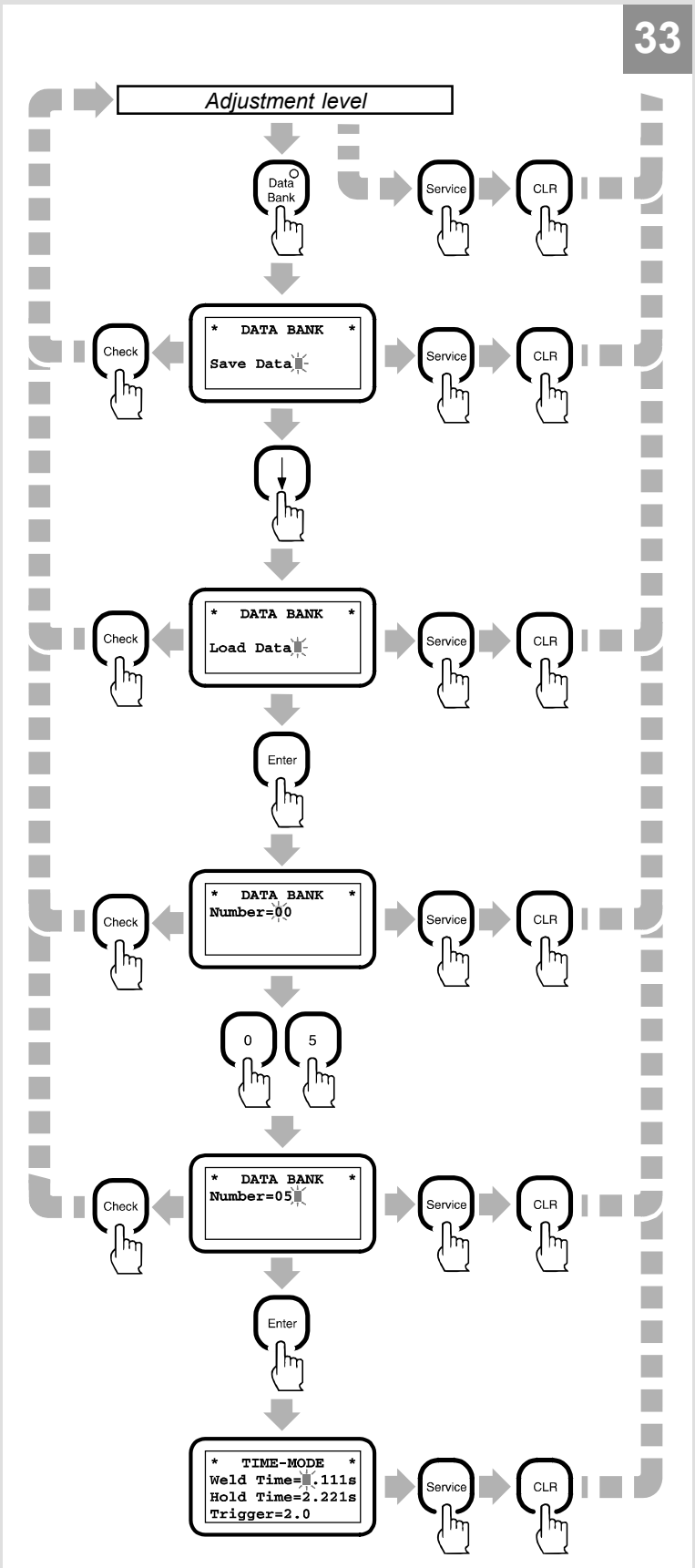
4. Enter the number of the desired storage location and confirm the entry by pressing the ***Enter*** key.

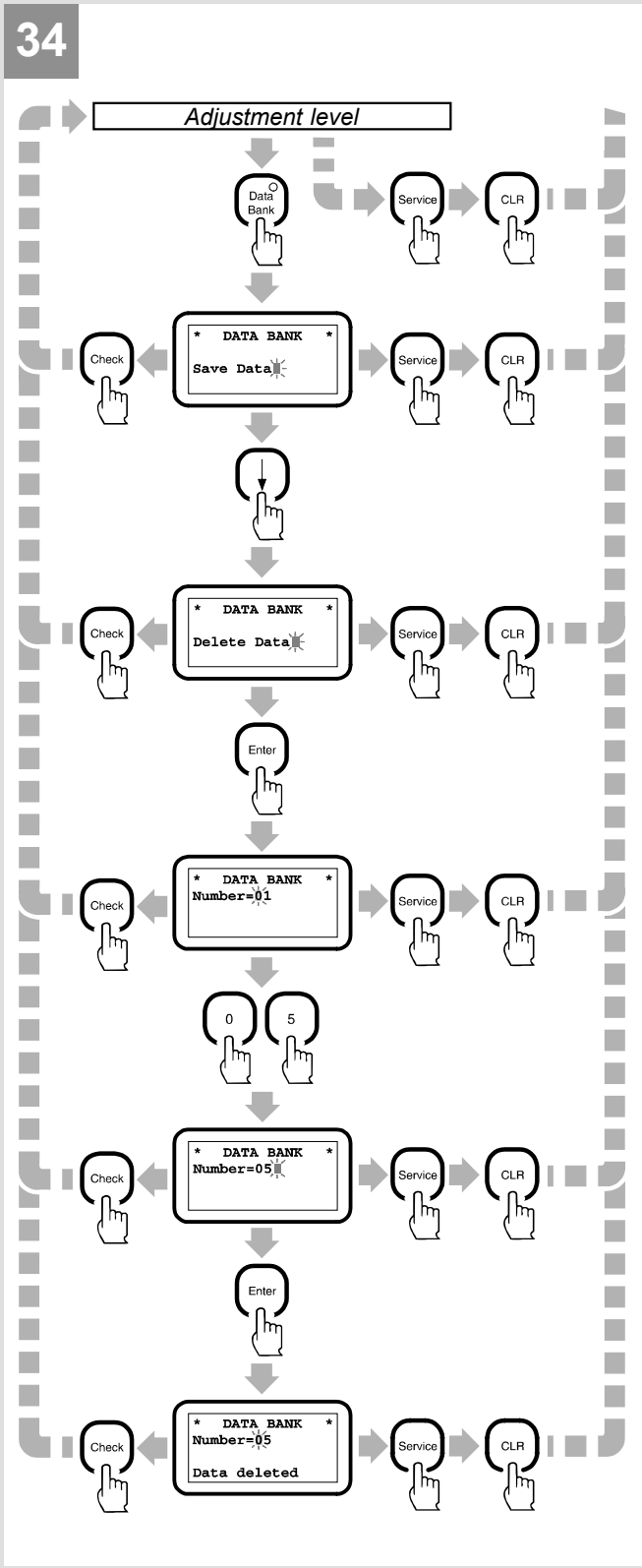
If the desired storage location is empty, the message "No Data" appears.

Select a valid number and confirm the number by pressing the ***Enter*** key.

After pressing the ***Enter*** key, the contents of the desired storage location appear in the display.

By pressing the ***Check*** key, you return to the initial position.





7.7.4 Deleting Data

After you have switched to the adjustment level,

1. press the ***Data Bank*** key.

The display now shows the first databank function "Save Data".

2. Using the cursor keys, select the "Delete Data" function ..
3. Press the ***Enter*** key.

The number of the last occupied storage location then appears in the display.

4. Enter the number of the desired storage location and confirm the entry by pressing the ***Enter*** key.

If the desired storage location is empty, the message "No Data" appears.

Select a valid number and confirm the number by pressing the ***Enter*** key.

The data in the desired location is deleted.

The message "Data deleted" appears in the display.

By pressing the ***Check*** key, you return to the initial position.

7.7.5 Print Data

Before you print data, make sure that a printer is connected to the serial port and that the printer is ready.

To print saved data, switch to the adjustment level.

1. Press the ***Service*** key.
2. Enter the code ***"23"*** .
3. Confirm the entry by pressing the ***Enter*** key.

After you have switched to the adjustment level,

4. press the ***Data Bank*** key.

The display now shows the first databank function "Save Data".

5. Using the cursor keys, select the "Print Data" function ..
6. Press the ***Enter*** key.

The number of the last occupied storage location then appears in the display.

7. Enter the number of the desired storage location and confirm the entry by pressing the ***Enter*** key.

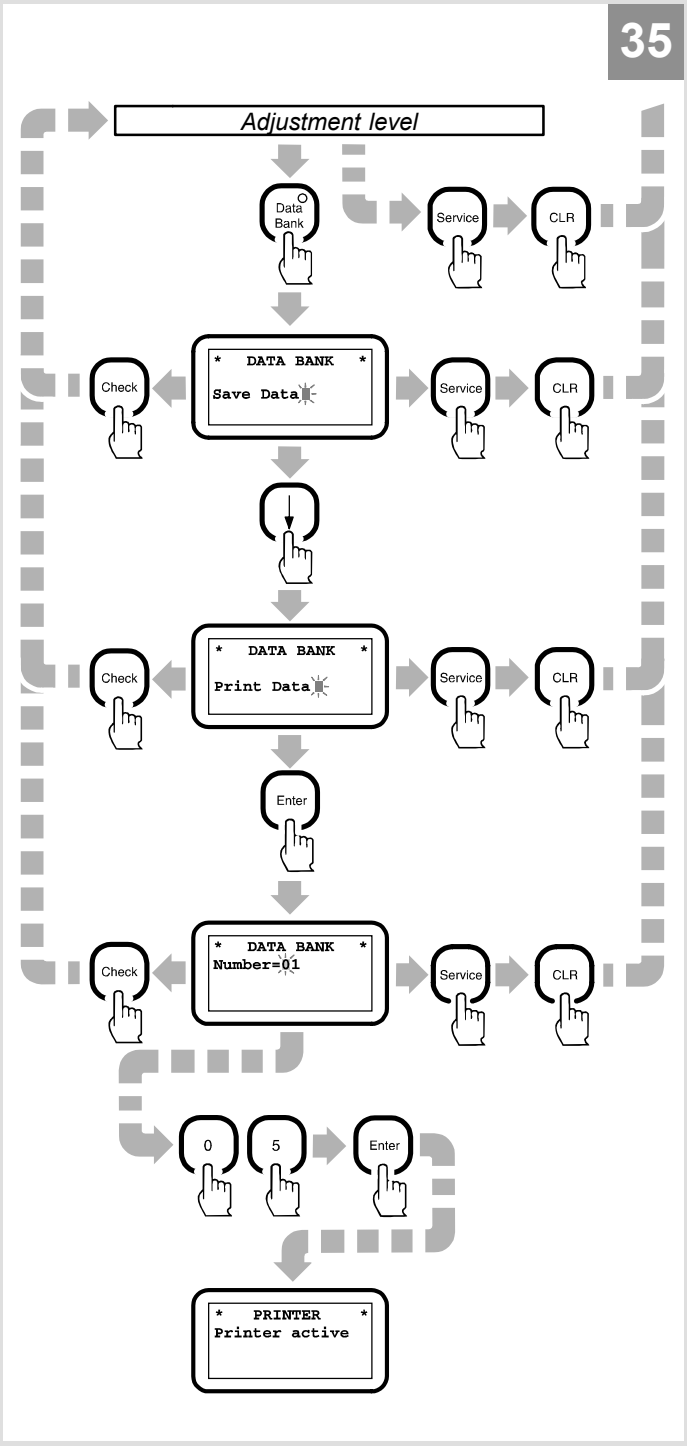
If the desired storage location is empty, the message "No Data" appears.

Select a valid number and confirm the number by pressing the ***Enter*** key.

All data stored in the databank can be printed out by selecting the number "00".

After pressing the ***Enter*** key, the print job is started.

If the printer is not connected or not online, the message "Not ready" appears in the display.



7.7.6 Printout of the Data Bank

Date / Time	:	11.11.55 / 11.11
Data Bank Number	:	40
Welding Mode	:	Time-Mode
Weld Time	:	1.000s
Hold Time	:	1.000s
Amplitude	:	100%
Energy maximum	:	1000Ws
Energy minimum	:	0000Ws
Delay Time	:	0.000s
After Pulse	:	0.000s
Booster	:	1:2
Horn Number	:	123456
Fixture Number	:	123456
Max. System Pressure	:	5.5
Speed	:	4.4

7.8 The 'F' Function Key

7.8.1 System Initialization

To prepare the Multipress and the Generator for the diverse tasks accorded them, the individual press functions are initialized depending on the application by the generator controller.

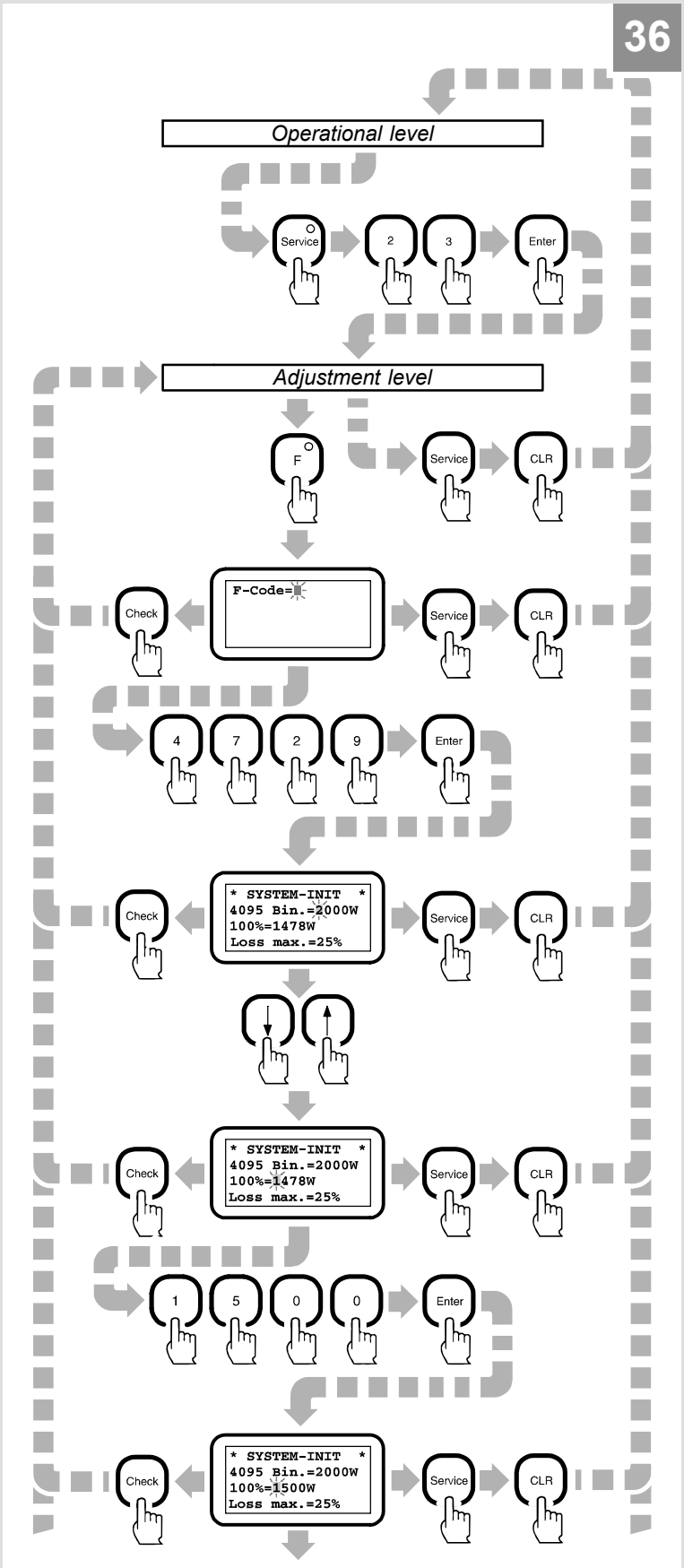
The hardware and software parameters of the welding machine are changed using the ***F*** key.

F Code = 4711

Software parameters

F Code = 4729

Hardware parameters



7.8.2 F Code = 4729

Parameter Display	Setting
*** SYSTEM-INIT ***	
4095 Bin.=	2000 / 3125
100%=	1000:1500:2000:3000
Loss max.=	10 - 40
Voltage=	1000 Bin
Travel-Mode=	on / off
Encoder=	1:1 / 1:09132
Start=	Manual / Impulse / Automatic
Homeposition=	on / off
Required=	on / off
Loss-Test=	before / after
Reset=	on / off
US-Stop=	on / off
Trigger=	before / after

7.8.3 Parameter Adjustment Using Code 4729

4095 Bin.=

- see table.

Power [W]	4095 Bin.
1'000	2000
1'500	2000
2'000	3125
3'000	3125

100%=

- Generator power (see ratings plate).

Loss max.=

- If this value is exceeded during the self-test, a vibration system error is output.
- Standard setting: 25%

Travel Mode

- If the press is equipped with a travel measurement system, this must be initialized to *ON* .
- Change the setting by pressing the ***CLR*** key.

Encoder=

- Must be initialized to 0.9312.
- Change the setting by pressing the ***CLR*** key.

Start=

- Must be initialized to *MANUAL*.
- Change the setting by pressing the ***CLR*** key.

Homeposition=

- If the press is not equipped with a final upper position switch, then this must be initialized to *OFF* .
- Change the setting by pressing the ***CLR*** key.
- Standard setting: ..... *ON*

Required=

- If the required piece count is not to be monitered, then this must be initialized to *OFF*.
- Change the setting by pressing the ***CLR*** key.
- Standard setting: ..... *ON*

Loss-Test=

- The self-test can be run either *BEFORE* or *AFTER* the weld is completed.
- If *AFTER* has been selected, then a system test is run after turning the machine on. After that, the system test is run after the delay time has run out. If the delay time is set to 0.000s, a system test is not conducted. It is better to run the machine with the system test, if possible.
- Change the setting by pressing the ***CLR*** key.
- Standard setting: ..... *BEFORE*

Reset=

- Must be initialized to *OFF*.
- Change the setting by pressing the ***CLR*** key.

US-Stop=

- The differential travel mode can be run with a stop switch using an optional adapter box. If a stop switch is used, this parameter must be initialized to *ON* . The welding process is activated by the trigger and a signal on the input of the adapter box ends the welding process. If no signal is sent, the weld time parameter setting serves to control the weld time. A time overflow error is output.
- Using the ultrasonic (us-) pulse, you can weld after the weld time is up.
- Change the setting by pressing the ***CLR*** key.
- Standard setting: ..... *OFF*

Trigger=

- The trigger only becomes active after the safety switch if set to *AFTER* .
- The trigger is active during the entire stroke if set to *BEFORE*. This is necessary if the welding distance is larger than 6 mm.
- Standard setting: ..... *AFTER*

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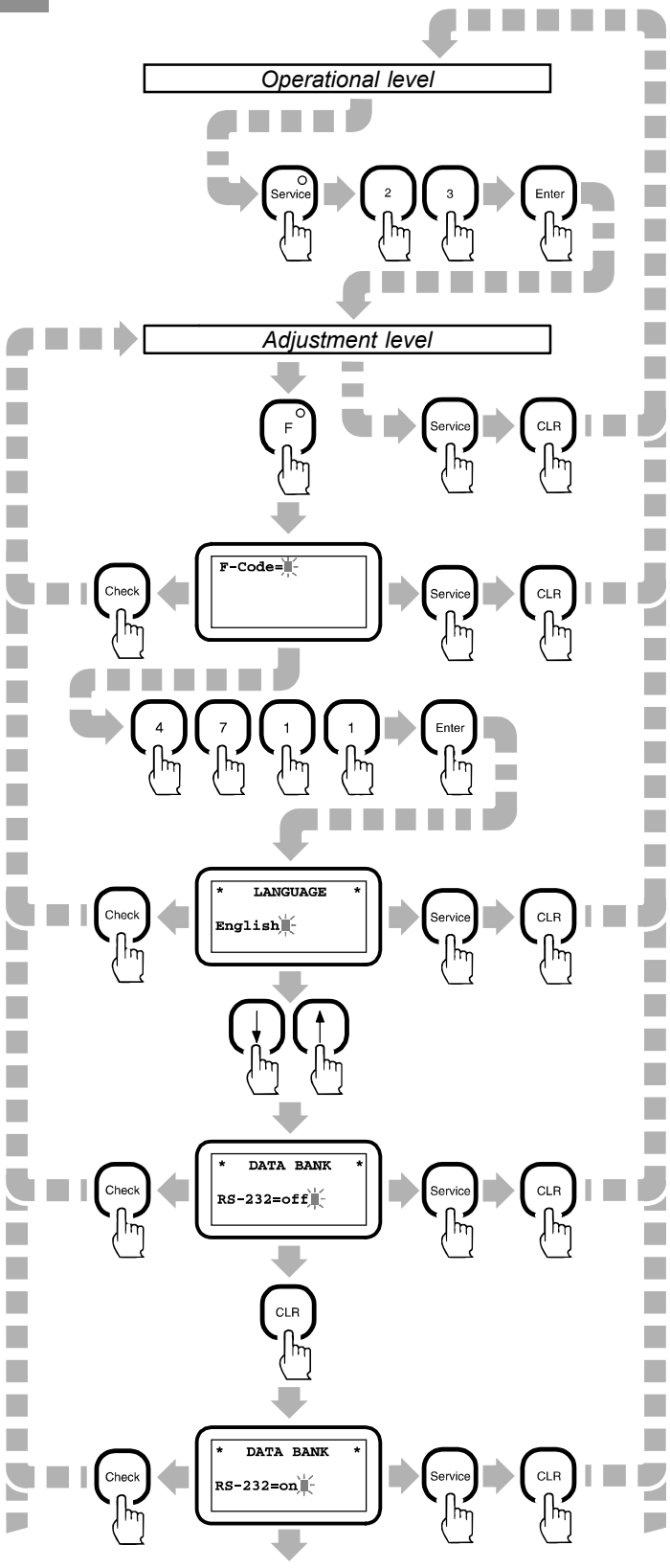

Operational level
Service
2
3
Enter
Adjustment level
F
Service
CLR
Check
F-Code=
Service
CLR
4
7
1
1
Enter
Check
* LANGUAGE *
English
Service
CLR
Check
* DATA BANK *
RS-232=off
Service
CLR
CLR
Check
* DATA BANK *
RS-232=on
Service
CLR

7.8.4 F Code = 4711

Parameter Display	Setting
* SYSTEM_INIT *	
Language =	Deutsch / English / Francais / Italiano / Espanol
* DATA BANK *	
RS-232=	on / off
* TIME HH:MM *	11:11
DATE DD:MM:YY	11.11.95
* GENERATOR *	Power=2000W

7.8.5 Parameter Settings for Code 4711

Language

- The user can select operation in *German, English, French, Italian* or *Spanish*.
- Change the setting by pressing the ***CLR*** key.

Data Bank*

- A databank can be selected over the RS 232 interface if set to *ON*.
- Change the setting by pressing the ***CLR*** key.
- Standard setting: ..... *OFF*

Time*

- Current time.

Date*

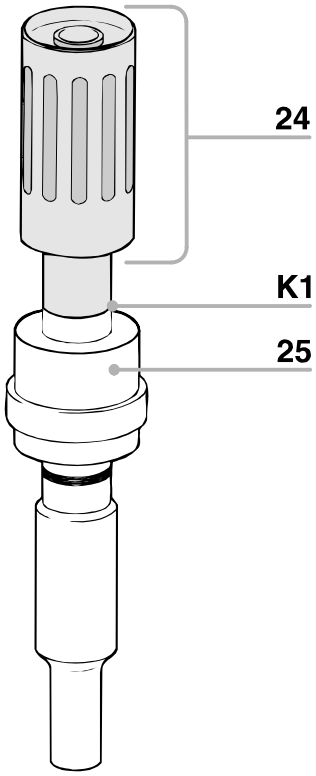
- Current date.

Generator*

- Generator power.

*** only for the PCS II**

1



8 Elements

8.1 Converter

The converter is a sensitive instrument.

Please handle with great care!

The converter (24) is the core of every ultrasonic welder.

A type C20-12 converter is used for the Ultrasonic Welding Press. It belongs to the category of piezo-electric converters.

Piezoelectric converters consist of several ceramic disks that change their size when an electric voltage is applied.

In the case of the ultrasonic welding converter, an alternating voltage with the nominal frequency (e.g. 20 kHz) is applied. This electric signal is converted by the piezoelectric elements into a mechanical vibration of identical frequency.

A mechanical vibration in the axial direction is thus available at the front end "K1" of the converter (24). The amplitude is usually too small to be used directly, so it is amplified by a booster (25).

The efficiency of a piezoelectric converter is extremely high. The small losses which occur during the conversion are noticeable in a rise in temperature of the converter.

Residual heat is dissipated by natural convection thanks to the special design of the converter.

Special applications require dissipation of heat by additional ventilation (optional).

The converter must not be warmed up to more than 60°C at the contact point "K1". Converter, booster, horn and generator may be damaged by overheating.

The converter must be fastened with a tightening torque of 30-40 Nm.

8.2 Booster

The correct amplitude at the horn is one of the most important factors for ultrasonics welding.

The geometrical form of the horn must match to the welding object. Finding the correct amplitude for the application is often difficult.

The booster intensifies the amplitude of the converter in a given ratio.

1:2 in our example.

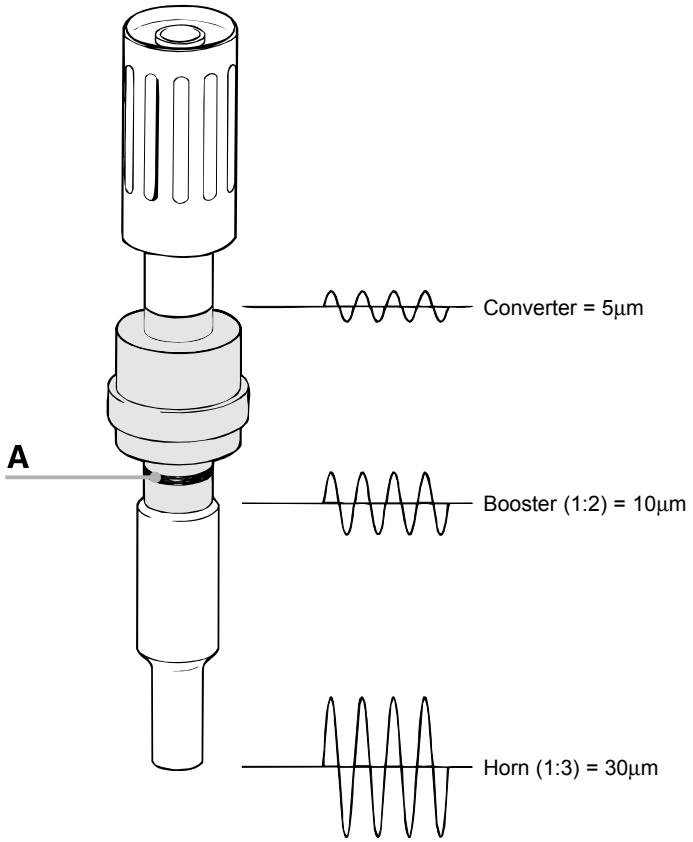
The factor of reinforcement / attenuation is given in the correspomding ratio. The ratio is designated with a colour code and a numerical value (A). (see table)

The booster must be fastened with a tightening torque of 30-40 Nm.

2

Example:

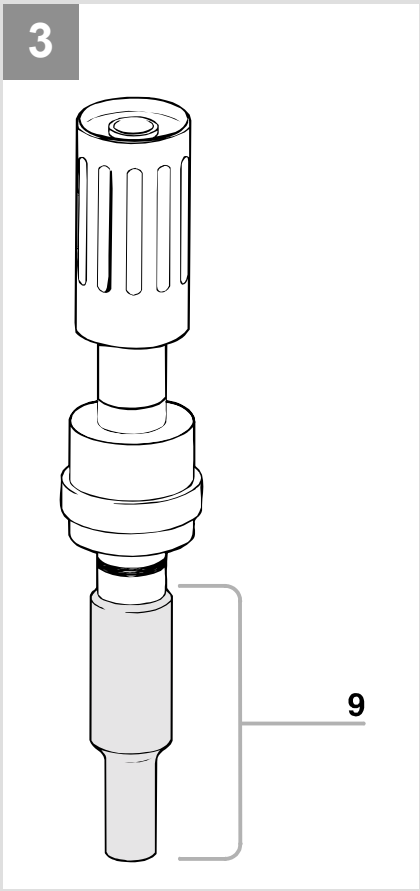
Converter: 5µ
Booster: 1:2 10µ
Horn: 1:3 30µ



Ultrasonic welders of the 20 series are available with the following booster types:

Reducing Booster	Color	Material	Booster	Color	Material
1 : 0.5 1 : 0.6	blue violet	Aluminium Aluminium	1 : 1 1 : 1.5	green yellow	Aluminium Aluminium
other ratios on request			1 : 2 1 : 2.5 1 : 3	white black brown	Titanium Titanium Titanium

3



8.3 Horn

Any changes to the metallic body of the horn will affect its vibration characteristics and should not be performed without consulting the manufacturer!

The horn is the tool that transfers the ultrasonic energy produced by the converter to the welding object in the form of an intensive vibration.

Since workpieces come in a variety of forms, horns have to be adapted to the specific requirements.

The horn is an acoustic body tuned to the resonance frequency. This accounts for restricted shaping possibilities.

The geometrical form of the horn should be kept as simple as possible.

Other important factors in addition to the geometrical shape of a horn are:

1. The horn must be tuned to the resonance frequency of 20'000 Hz (±50 Hz) at 20°C. During operation a tolerance of +150 Hz / -250 Hz is permitted.
2. For the horn to vibrate correctly it must be designed as far as possible to move in an axial direction at its transmission surface.
   The aim is to produce pulses on the horn face that act as far as possible in an axial direction and which can be transmitted to the welding object.
3. The amplitude of the horn is determined by means of its design. For the production of horns it is vital to have a knowledge of the load capacity of various materials.

8.3.1 Horn materials

Horns are manufactured exclusively from specifically high-strength materials; namely high-strength aluminium, titanium and steel alloys.

The choice of material depends largely on the intended application.

Various factors are crucial for choosing the material:

1. The strength of the horn material in conjunction with the amplitude to be attained.
2. The surface condition of the material and its related surface finishing characteristics.
3. The ultrasonic transmission characteristics.
4. The heat conducting characteristics of the horn material.

Allowance must also be made for the fact that horns are subject to immense mechanical loads.

It is extremely important, therefore, to design the horn in such a way as to enable the plastic part to be joined under optimal conditions.

The horn surface may have a coating for abrasive plastics for longer service life.

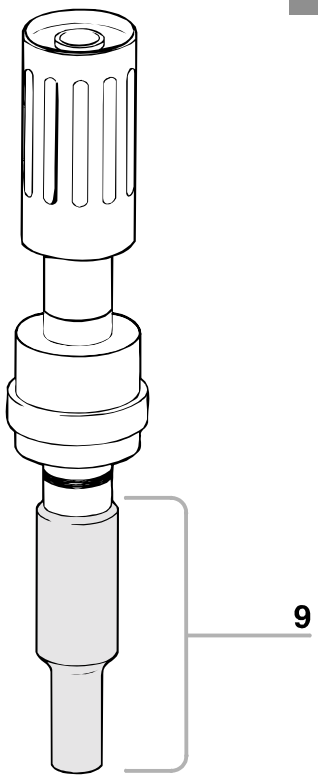
RINCO has a long record and a lot of experience in horn manufacture.

Horns that are manufactured without the necessary theoretical and practical experience are bound to lead to unsatisfactory and poor welding results and hence to inferior product quality.

In some cases the vibration system and generator may be damaged.

The horn must be fastened with a tightening torque of 30-40 Nm.

4



8.4 Fixture

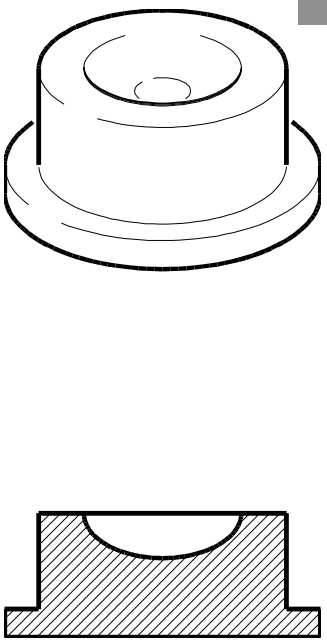
The fixture serves a variety of purposes:

- It holds the welding object in the same position throughout the welding operation.
- It simplifies the assembly process (laying up of various parts).
- It has a positive effect on the acoustic process of the ultrasonic welding.
- It prevents damage to the welding object surface.

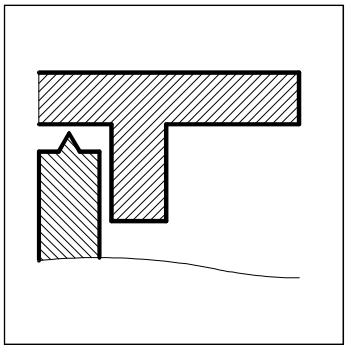
The degree of success and the level of quality depend in many ways on the design of the fixture.

It is therefore vitally important for the fixture and the horn to be produced by the same manufacturer. He knows the requirements to be met by the application.

5



9 Application examples



9.1 The weld

The typical profile for an ultrasonic weld serves two functions:

It is designed as a tongue and groove joint in order to

- facilitate the lay-up of work
- guide the two halves of the workpiece precisely during the processing operation.

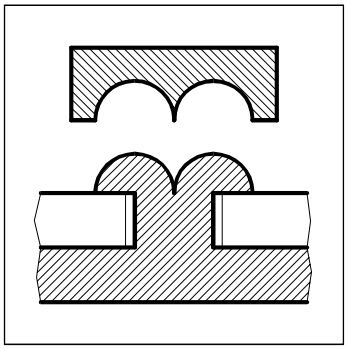
The energy director integrated in the contact zone acts as an energy concentrator, and at the same time it supplies the necessary molten mass for an optimum joint.

The weld profile is adapted to the particular case of application, i.e. there are several variations.

Machine set-up parameters such as welding force and amplitude are calculated to enable the top half of the workpiece to move in phase with the horn.

The bottom half lies in the fixture and is passive. This brings about a phase shift in the movement between the two halves of the workpiece, resulting in friction at the point of contact.

This highly intensive ultrasonic oscillation causes the point of contact between the two halves of the workpiece to melt instantly. The simultaneous input of force from the press, which lasts longer than the ultrasonic pulse, holds the welding halves of the workpiece until the molten plastic solidifies.



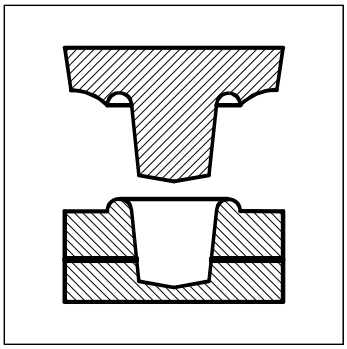
9.2 Rivet joints

Rivet joints are used among other things to join injection moulded plastic parts to parts made of a different material. Moulded spigots on the injection moulded part penetrate the foreign part that is to be riveted to it. The section projecting above the foreign part is then deformed into a rivet head using a pre-formed horn. The cavity in the horn tip must be designed to take up the volume of the displaced material. The amplitude of the horn must be set to result in complete decoupling between the workpiece and the horn surface.

This results in the generation of direct frictional heat at the point of contact between the plastic part and the metallic surface of the horn. Instant plastification takes place at this point. The resulting rivet head is given enough time to harden under the action of force from the press.

Multiple tools are often used for riveting operations in order to rivet parts at various points simultaneously.

9.3 Spot welding



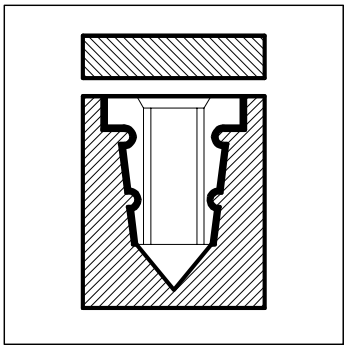
Spot welding is called for, for example, wherever large thermoplastic parts cannot be loaded under a welding press for practical reasons.

In these cases the welding head is taken to the object to be welded. The weld is then performed with a welding gun either manually or by robot. The advantage of ultrasonic spot welding is that the parts do not require any special preparations at their welding points (an energy director is not essential).

Even deep-drawn parts can thus be processed without difficulty. The ultrasonic tool is designed to generate a relatively high amplitude.

The tip of the horn is specially formed so that the advancing tip penetrates the half to be welded and the displaced material is caught and positively shaped in an outer ring.

9.4 Embedding of metal parts



Preformed openings to be firmly plugged by a threaded insert pin, connector or the like.

The sontrode makes contact with the foreign part and sets it vibrating, the high intensity of its movement causing the plastic body to plasticize at the point of contact.

The penetrating movement executed simultaneously by the welding press displaces the now ductile material into the specially provided backtapers and cavities in the inserted part.

When the displaced material solidifies, the embedded part remains firmly trapped. It is thus invested with high tensile and torsional strength.

Advantage:

The assembly operation can take place subsequently at a less costly workstation. It is possible, therefore, possible for the injection moulding operation to take place fully automatically, whereas with the traditional insert moulding process it is always interrupted. Expensive plants can thus be put to optimum use.

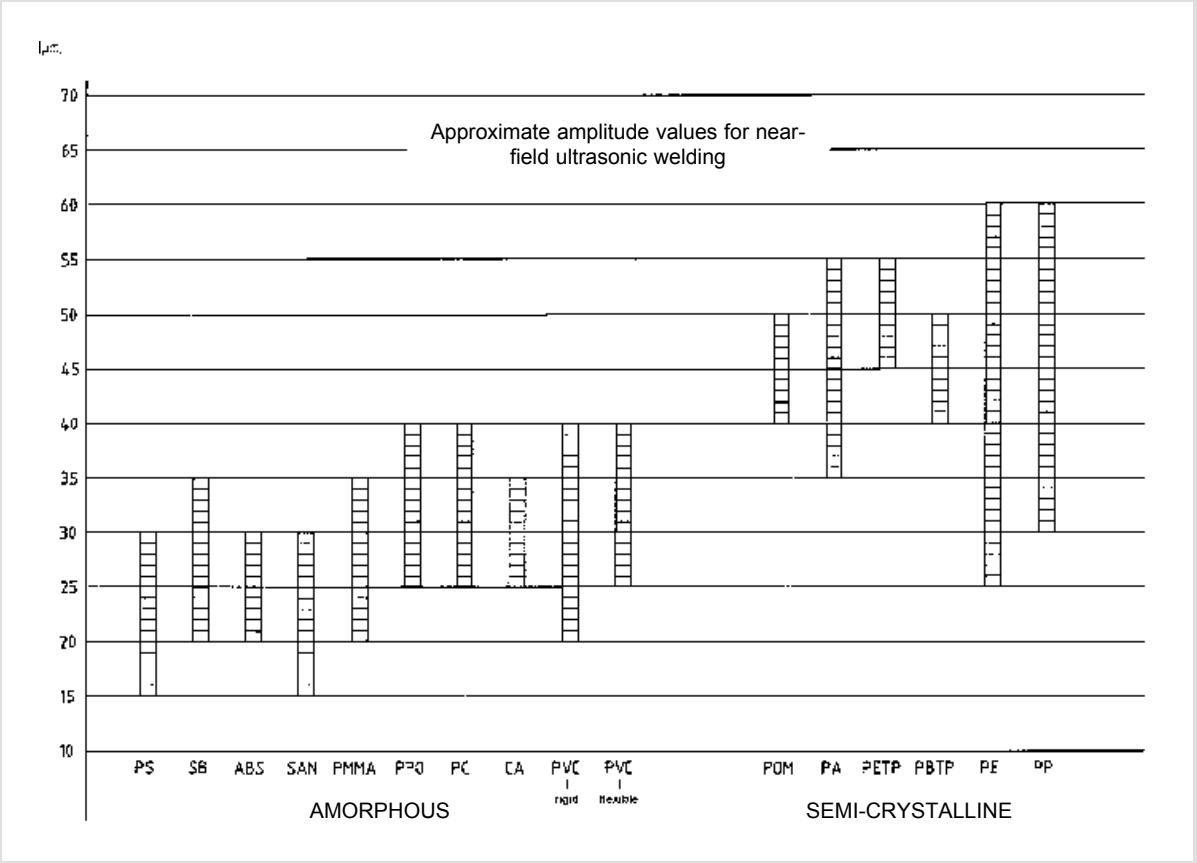
9.5 Designing of joint zones

The precise and expert design of joint zones ensures a correct layout of the parts and hence perfect and flawless welded products.

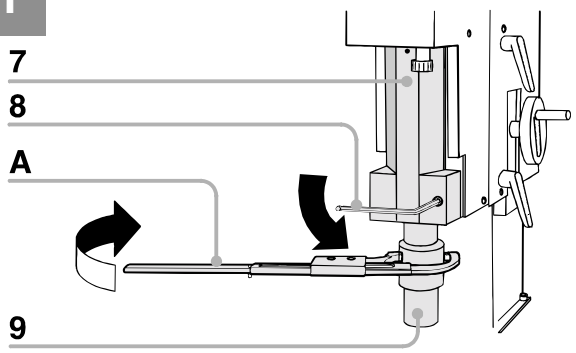
Design guidelines covering the entire spectrum of ultrasonic welding have been compiled and drawn up by RINCO Ultrasonics AG. Please ask for relevant data sheets

To ensure the correct layout of your parts, the RINCO team of specialists will be glad to assist by providing technical advice on the design of joint zones.

9.6 Approximate amplitude values for near-field ultrasonic welding



1



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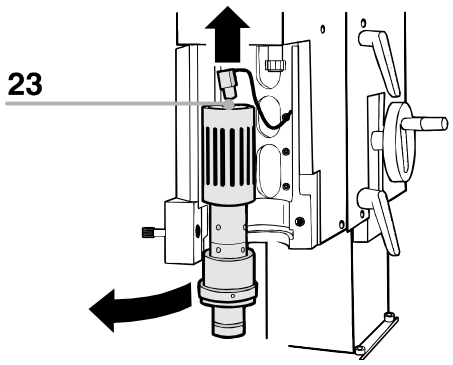

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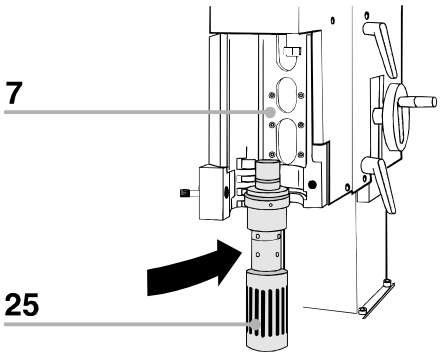

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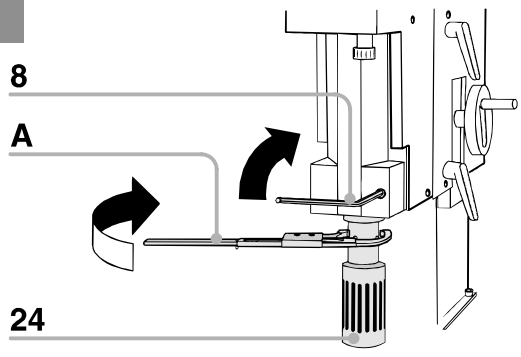


10 Retooling

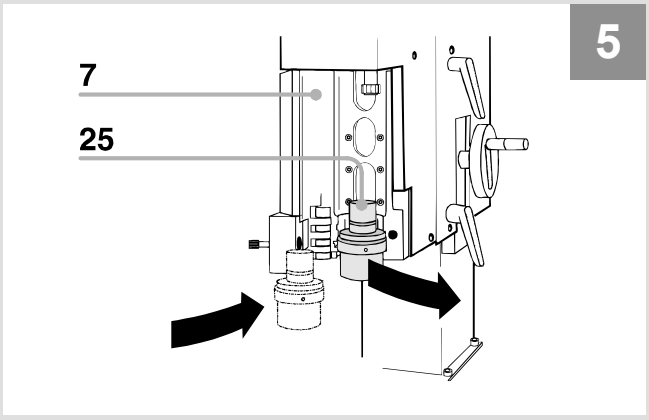
10.1 Changing the booster

Make sure you set the power switch of the generator to "OFF" before opening the converter housing (7)! 1

1. Release and unscrew the horn (9) with the special wrench (A) supplied.
2. Release the fastening screw (8) with a socket wrench (size 6 mm) and open the converter housing (7).
3. Move the complete vibration system out of the converter housing. 2
4. Pull the plug out of the RF socket (23).
5. With the booster (25) on top, re-insert the vibration system in the converter housing (7). 3
6. Close the converter housing and fix in position with the socket wrench (8). 4
7. Release the converter (24) with the special wrench (A) and unscrew from the booster.
8. If the thread jams, release the converter (24) with a slight tap on the wrench.

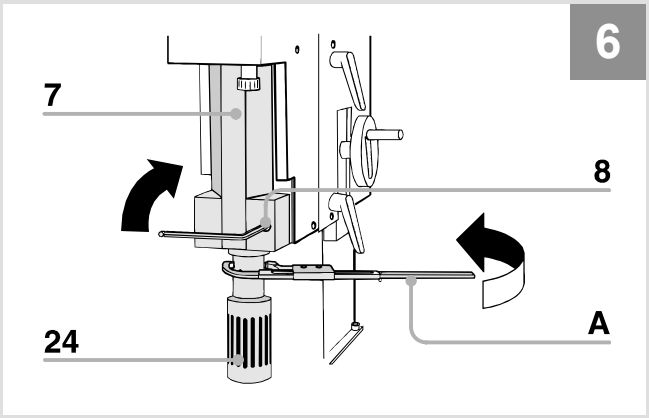
5

9. Re-open the converter housing (7)
10. Take out the booster (25).
11. With the thread for the converter pointing downwards, insert the new booster in the converter housing.



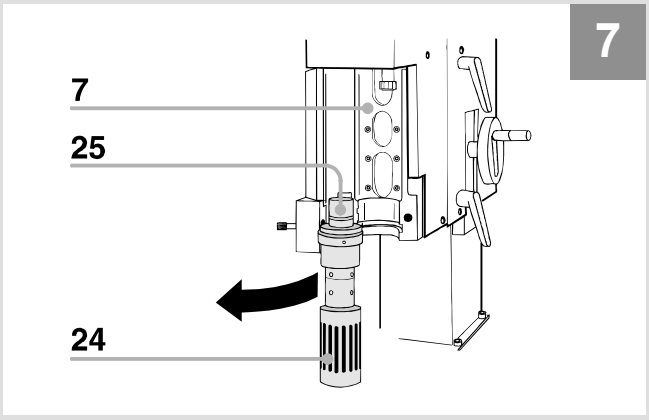
6

12. Close the converter housing (7) and tighten the fastening screw (8).
13. Screw the converter (24) into the booster and tighten with the special wrench (A).



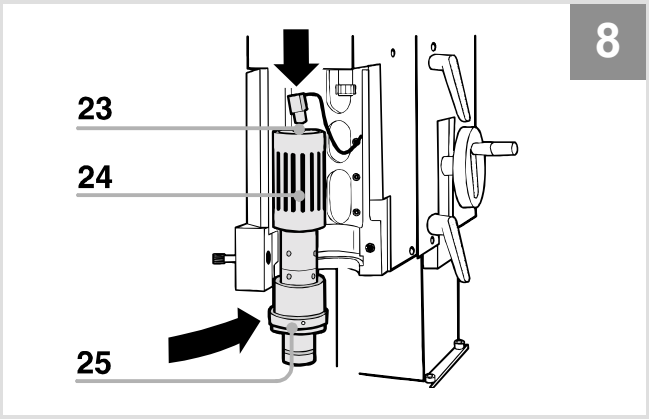
7

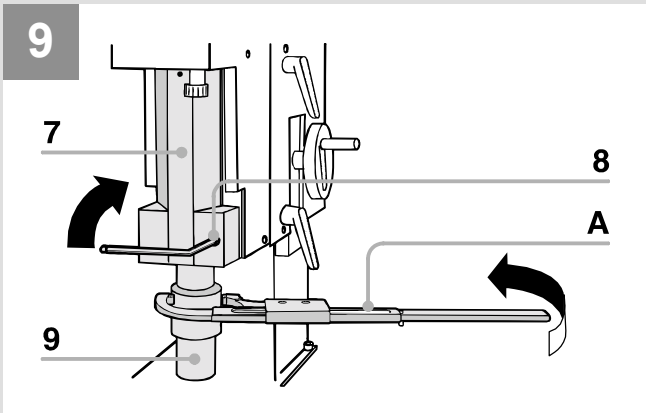
14. Re-open the converter housing (7).
15. Take the converter (24) with the attached booster (25) out of the converter housing and turn round the other way.



8

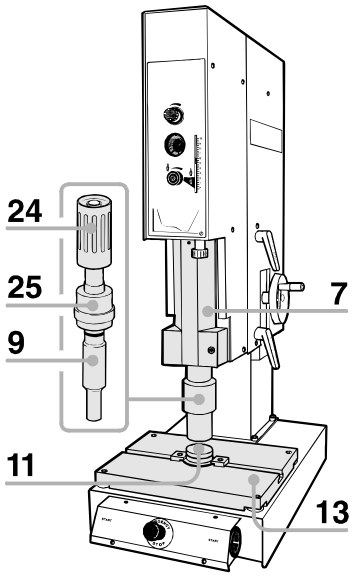
16. Insert the RF plug in the RF socket (23).
17. With the converter (24) on top, re-insert the booster (25) in the converter housing.





18. Close the converter housing (7) and tighten the fastening screw (8).
19. Screw the horn (9) back into the booster and tighten it with the special wrench (A).

1



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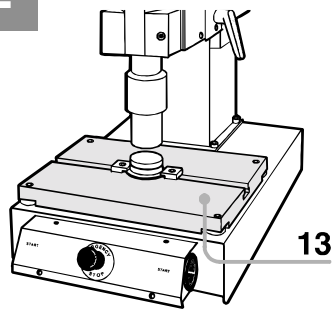

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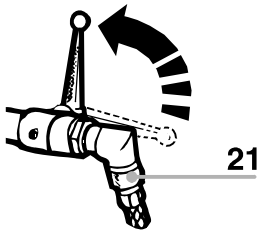


11 Cleaning and maintenance

11.1 General maintenance jobs

Cleaning and maintenance jobs may only be carried out by specially trained staff.

Before beginning maintenance jobs, make sure that all energy sources such as the power and compressed air supply are disconnected.

Attention: Never clean the keypad or plastic sheeting of the generator with caustic agents.

The Multipress and Generator require no special maintenance.

However, regular cleaning of

- actuator,
- clamping table (13),
- fixture (11),
- horn (9),
- booster (25),
- converter (24),
- converter housing (7)

is essential for a long and trouble-free operation of the press system.

1

11.2 Clamping table

2

Clean clamping table (13) daily.

11.3 Pneumatic unit

When work is completed, move compressed air valve to the vertical position. In this way, no maintenance will be required.

11.4 Lubrication system

Maintenance-free.

11.5 Generator

Maintenance-free.

11.6 Vibration system

Work may only be carried out on the vibration system and converter housing when the mains voltage is switched off! High voltage!

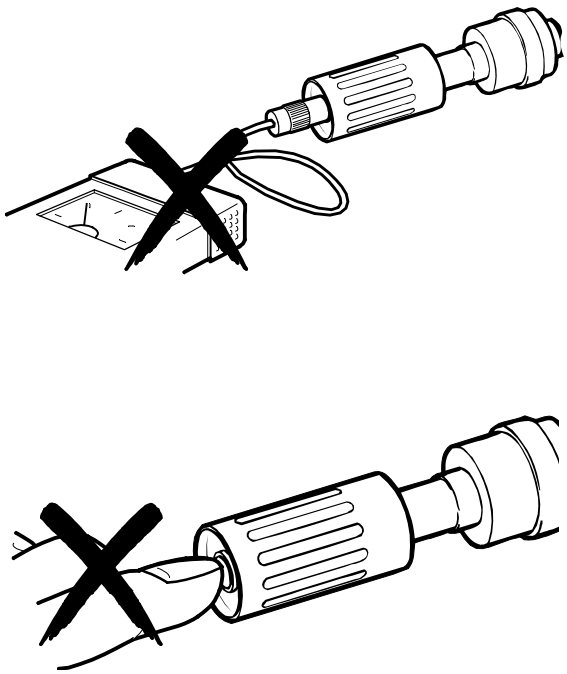
3

Avoid contact with the RF socket (23) of the converter.

Never connect any measuring instruments to the RF socket of the converter!

The converter is electrically charged even after switching off the generator.

3



11.7 Threaded coupling

4

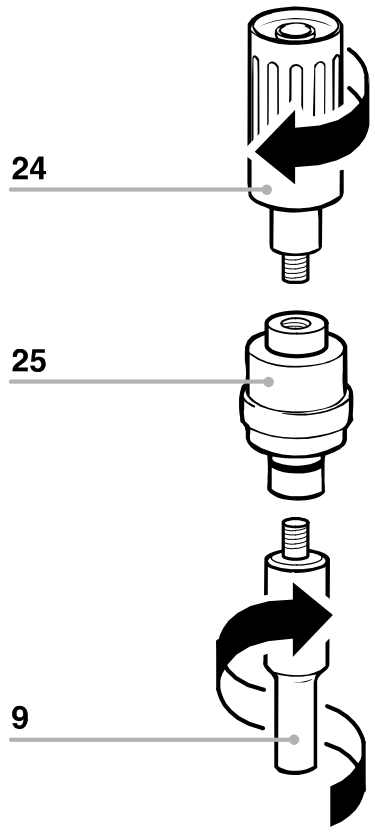
The converter (24), booster (25) and horn (9) are joined together by threading couplings.

Tightening torque: 30 - 40 Nm.

Black marks on the surface of the booster (25) or horn (9) are easy to remove.

1. Lay out a polishing cloth on a level surface.
2. Draw the blackened area over the polishing cloth.

4



12 Error messages and trouble shooting

Troubleshooting may only be carried out by specially trained staff. In case of doubt, contact the service centre or the manufacturer directly (see appendix)

12.1 Error messages / corrective action: switching on

Error	Possible cause	Corrective action
Generator cannot be switched on	- no voltage supply - EMERGENCY-STOP button pressed - fuse faulty - module not in its housing	- insert mains plug - release EMERGENCY-STOP button - test fuses F1-F5 - insert module and bolt together

12.2 Error messages / corrective action: set-up and welding

Error	Possible cause	Corrective action
Horn is lowered but ultrasonics fail to start	- Trigger set too high - Trigger faulty	- set trigger lower - replace trigger
The parts are not welded closer together despite an increased welding time	- stop is set too low	- set stop higher
Press returns without welding	- safety switch not reached	- press start keys until safety switch is reached or hold time has run out.

12.3 Generator error messages during operation

Error	Number	Possible cause
"OVERLOAD"	1	- Trigger set too high - maximum welding pressure too high - generator output too low for intended application - vibration system faulty
"TIME OVERFLOW"	2	- all of the energy has not yet flowed into the part after having reached the maximum welding time.
"TIME UNDERFLOW"	3	- all of the energy has flowed into the part before the maximum welding time has been reached.
"ENERGY TOO LOW"	4	- the minimum desired amount of energy has not been transferred to the part.
"ENERGY TO HIGH"	8	- the maximum allowable amount of energy has been exceeded.
"VIBRATION SYSTEM"	-	- faulty sonotrode or sonotrode incorrectly tuned - faulty booster - faulty converter - faulty HF cable or HF cable not connected - faulty generator - frequency change due to coupling with the fixture
"NO RF-SIGNAL"	-	- generator module incorrectly plugged in - faulty generator module
"ABORT"	-	- start button released before safety switch was reached or before hold time has run out
"HARDWARE"	-	- faulty valve in actuator - faulty pressure monitoring switch in actuator - faulty safety switch - faulty home position switch - home position switch not adjusted - stroke smaller than 6 mm - fault in generator - fault in dual safety switch

An error is acknowledged by pressing the ***CLR*** button. By pressing the ***Check*** button, you enter the current menu.

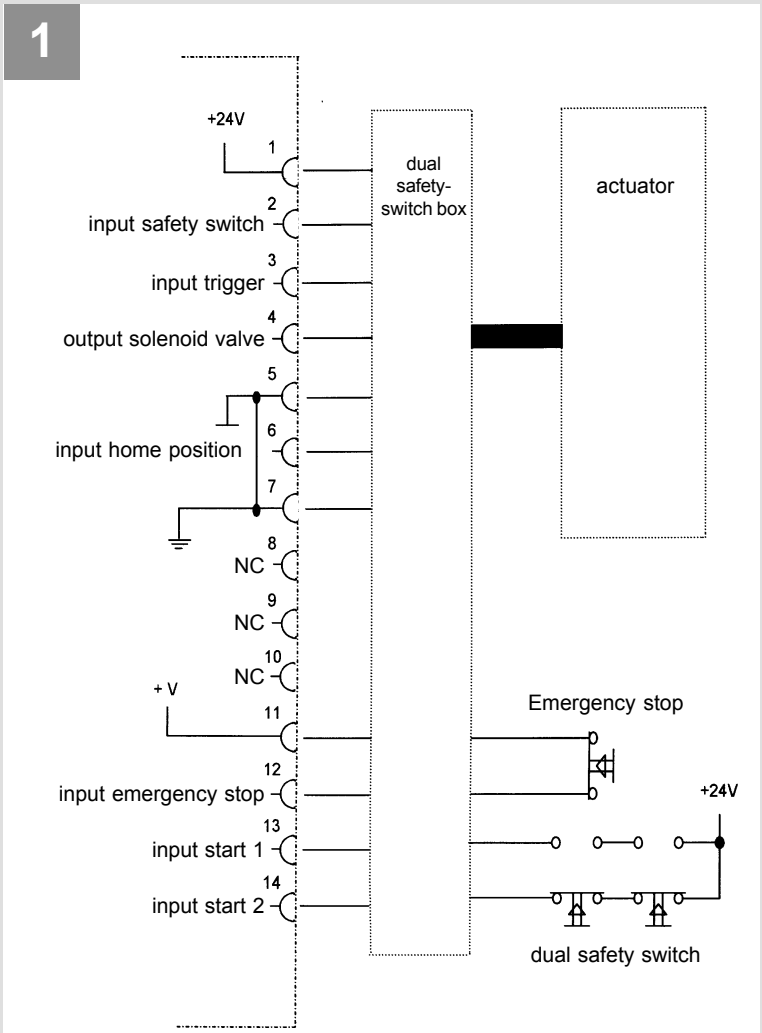
The "HARDWARE" error can only be canceled by switching the unit off.

13 Electrical Diagrams

13.1 Electrical Diagrams for the PCS Generator

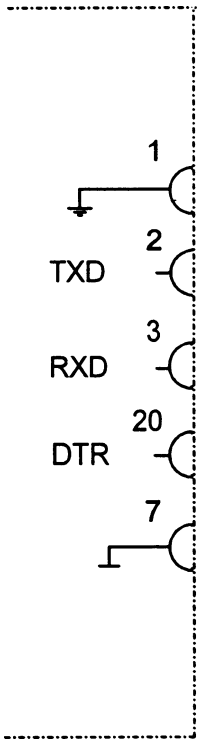
13.1.1 Actuator STO1 CE

1



13.1.2 RS 232 STO6

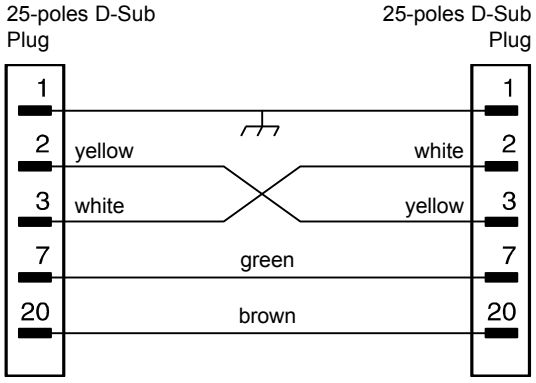
2



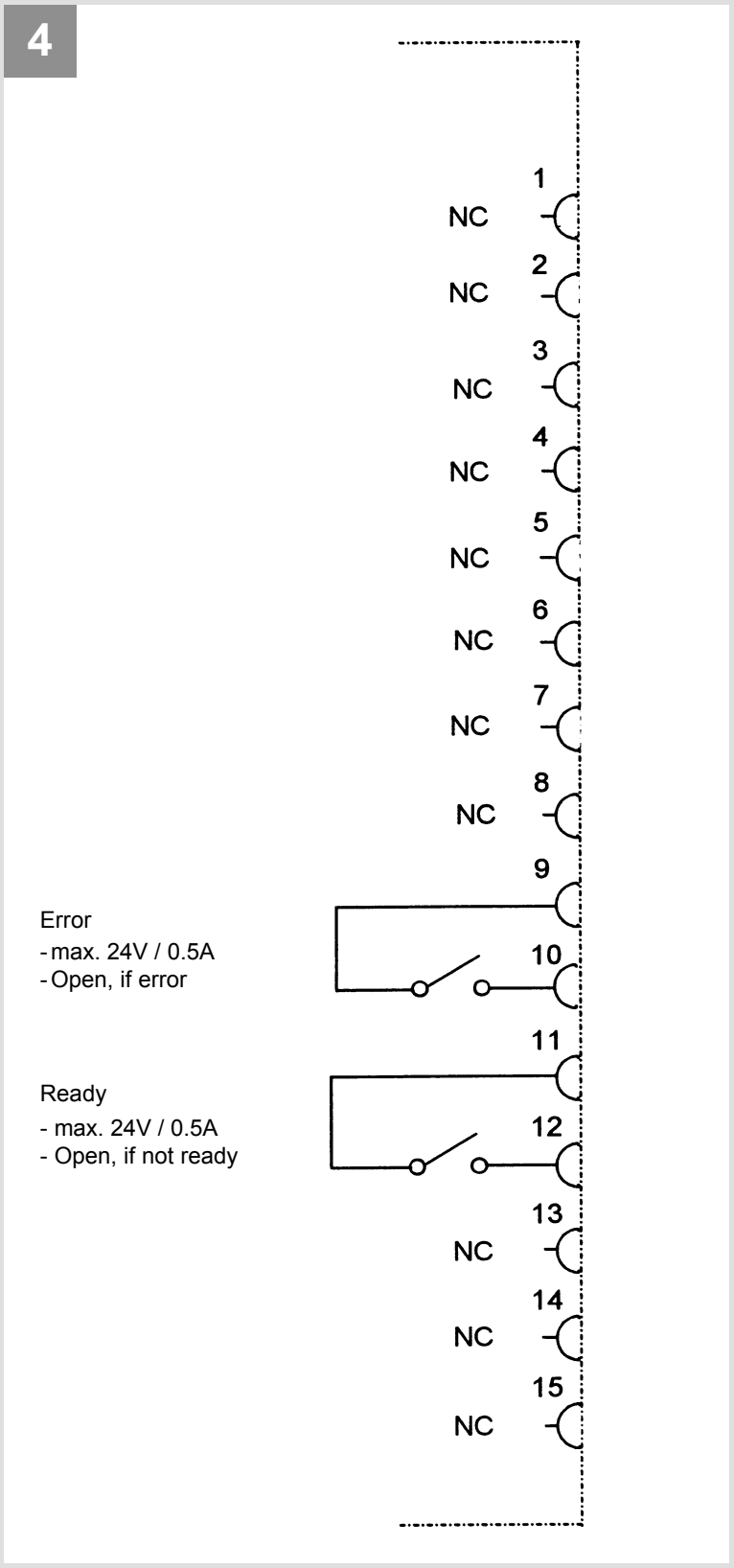
The other pins are not connected.

RS 232 Cable

3

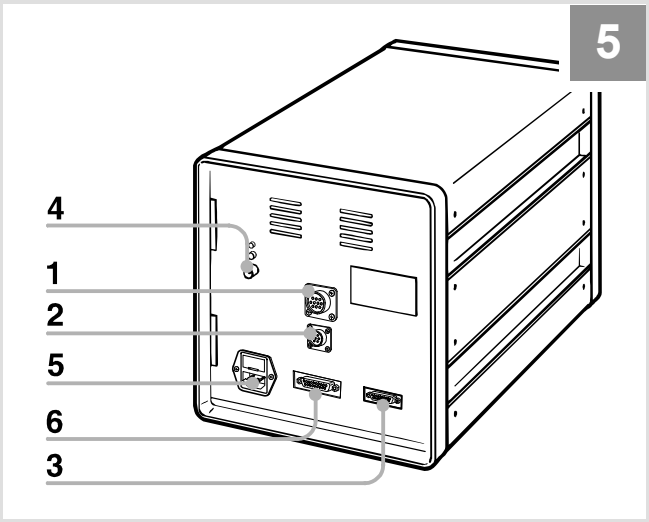


13.1.3 Interface STO3



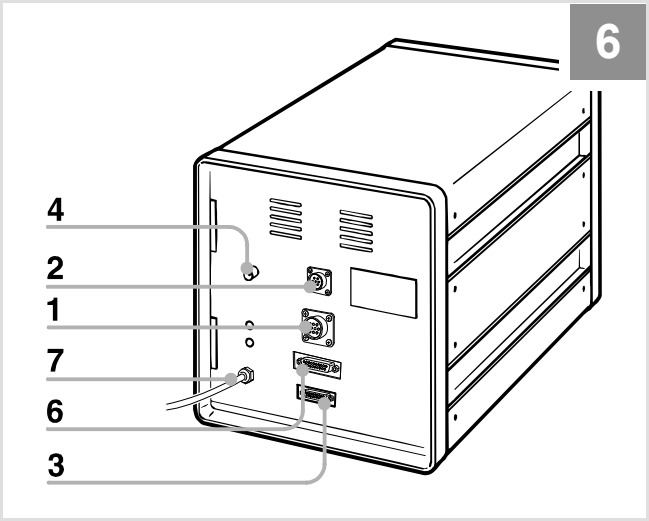
13.2 Generator rear panel 1000 / 1500W

1 STO1
2 STO2
3 STO3
4 STO4
5 STO5
6 STO6



13.3 Generator rear panel 2000 / 3000W

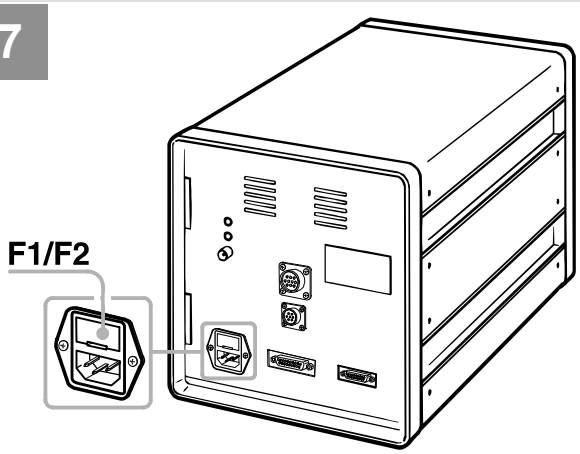
1 STO1
2 STO2
3 STO3
4 STO4
6 STO6
7 ST6



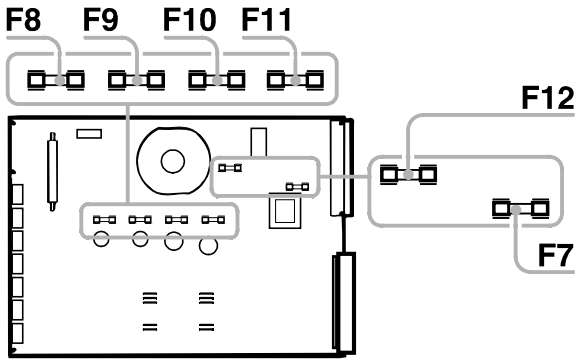
List of unit sockets			General order-No.	RINCO order-No.
STO1	Appliance socket	14-pole AMP	0-182641-1	5034
STO2	Appliance socket	7-pole AMP	0-211398-1	5030
STO3	Appliance socket	SUB-D 15 pole	77 SD A15 S	5372
STO4	Appliance socket	Lemo 2	ERA.2S.408.CTL	2651
STO5	Appliance socket	250V / 8A	---	5053
STO6	Appliance socket	SUB-D 25 pol.	77SD B25S	5040

List of connection plugs			General order-No.	RINCO order-No.
ST1	Plug	14-pole AMP	0-182649-1	3496
ST2	Plug	7-pole AMP	0-211400-1	3617
ST3	Plug	SUB-D 15 pole	77 SD A15 P	5041
ST4	Plug	Lemo 2	FFA.2S.408.CTAC52	2647
ST5	Mains cable	250V	depending on country	---
ST6	Mains cable	250V	depending on country	---

7



8



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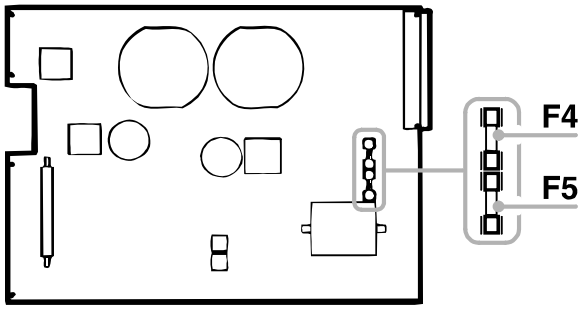

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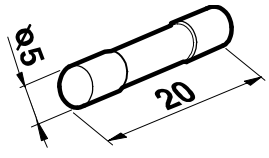


13.4 Fuses Generator 1000W / 1500W

Fuses are to be found in the following assemblies:

Power socket

PCS Module

Generator module

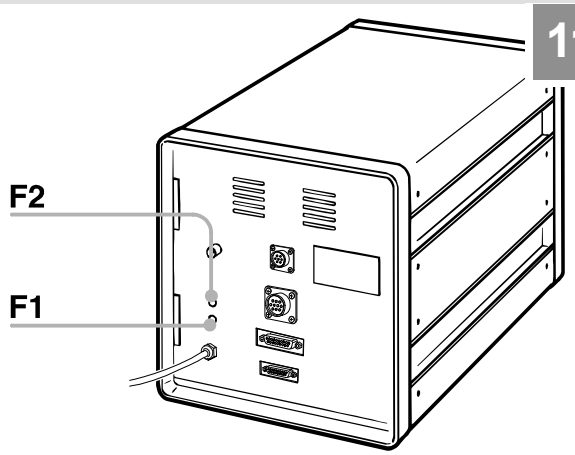
All fuse dimensions: 5 x 20 mm.

13.5 Fuses Generator 2000 / 3000W

Fuses are to be found in the following assemblies:

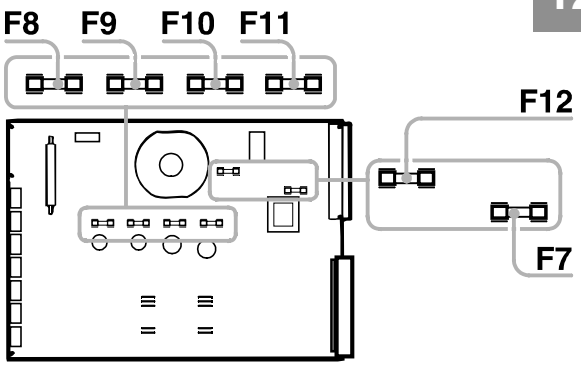
Power socket

11



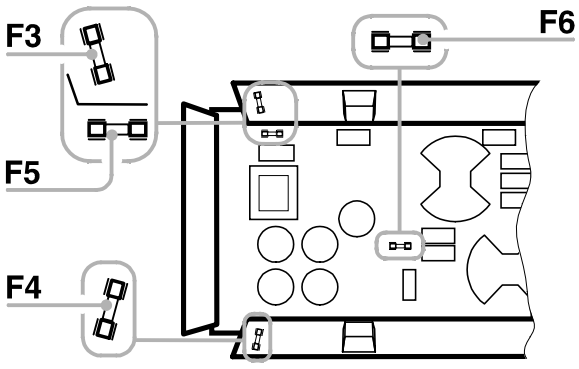
PCS Module

12



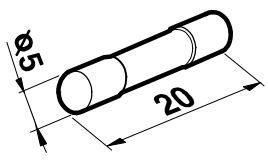
Generator module

13



All fuse dimensions: 5 x 20 mm.

14



13.6 List of fuses Generator 1000 / 1500W

Generator	Power socket		Generator module	
	F1	F2	F4	F5
GM20-1000	6.3 A/T	6.3 A/T	6.3 A/T	100 mA/T
GM20-1500	8 A/T	8 A/T	8 A/T	100 mA/T

13.7 List of fuses Generator 2000 / 3000W

Generator	Power socket		Generator module			
	F1	F2	F3	F4	F6	F5
PIM 20-2000	10 AT	10 AT	10 AT	10 AT	10 AT	400 mA/T
PIM 20-3000	16 AT	16 AT	16 AT	16 AT	16 AT	400 mA/T

13.8 List of fuses PCS Module

PCS Module					
F7	F8	F9	F10	F11	F12
50 mA/T	400 mA/T	400 mA/T	400 mA/T	1.25 A/T	400 mA/T